ONWA®

KR-1338/1668

KR-1338/1668
SERVICE MANUAL

10.4″ TFT COLOR MARINE RADAR

TABLE OF CONTENTS

1. GENERAL

1.1 Outline

This manual provides the information necessary for the servicing and adjustment of the radars MODEL 1338, 1668.

The antenna unit uses a Log IF amplifier.

The table below shows the major specifications of the each model. The same program is installed on all models, but the menu setting through factory menu is different between the models.

Functions	KR-1338	KR-1668
Maximum range	36 NM	64 NM
Program Number	1002XX−XX	
Tuning Voltage (displayed at manual tuning)	4.9 V to 32V	
Antenna Rotation	about 24 rpm	
Antenna Rotation	4 kW	4/6 kW

KR-1338-SME-1

The major parts and P.C. Boards used in the display and scanner units are tabulated on the next page.

1.2 Boards & Major Components

	Board	KR-1338	KR-1668
DISPLAY UNIT	PROCESSOR Board	**MAIN 0910**	
	POWER SUPPLY Board	**PWR 0913**	
	FILTER Board	**FIL 0912**	
	PANEL Board	**KEY 0912**	
SCANNER UNIT	MODULATOR Board	**MOD 0904A**	**MOD 0904B**
	IF AMP Board	**IF 0711**	
	RTB Board	**–**	**CON 0906**
	BEARING SIG GEN Board	**–**	**HBP 0905**
	MIC Board	**–**	**RCN 0907**
	MIC	**NJT-1968B**	
	Magnetron	**MAF1421B/MSF1421B**	**MAF1421/MAF1422B**
	Circulator	FCX73C	
	Scanner Motor	BM-9256	BM-8256
Cable	Signal Cable	**KRC-003-10(10m)** **KRC-003-15(15m)** **KRC-003-20(20m)** **KRC-003-30(30m)**	

KR-1338-SME-2

1.3 Specifications

SCANNER UNIT

		KR- 1338	KR-1668
Radiator Type		Slotted Waveguide Array	
Radiator Length		56cm	120 cm
Horizontal Beamwidth		4°	1.9°
Vertical Beamwidth		20°	22°
Sidelobe Attenuation	Within ±20° of mainlobe	-18 dB or less	-24 dB or less
	Outside ±20° of mainlobe	-23 dB or less	-30 dB or less
Polarization		Horizontal	
Antenna Rotation		24 rpm nominal	
Scanner Housing Stureruct		Radome	Open nominal
Compass Safe Distance	Standard	0.9 m	1.0 m
	Steering	0.7 m	0.74 m

KR-1338-SME-3

TRANCEIVER

	KR-1338	KR-1668
Magnetron	MAF1421B/MSF1421	MAF1421/MAF1422B
Frequency &Modulation	9410 MHz ± 30MHz,P0N	
Peak Output Power	4 kW nominal	6 kW nominal
Pulse Length & Pulse Repetition Rate	0.08 US, approx 2100 Hz（Short Ranges:0.25 nm -1.5 nm)	
	0.3 US, approx 1200 Hz(Middle Ranges: 1.5nm - 3nm)	
	0.8 US, approx 600 Hz(Long Ranges: 3 nm and above)	
Modulator	FET Switch	
Duplexer	Circulator with diode limiter	
Receiver Front End	MIC(Microwave IC)	
Tuning	Automatic or Manual	
Intermediate Frequency	60 MHz	
Bandwidth	25 MHz(0.08 US, 0.3 US), 3 MHz (0.8US)	

KR-1338-SME-4

DISPLAY UNIT

<table>
<tr><td colspan="2"></td><td colspan="7">KR- 1338</td><td colspan="10">KR-1668</td></tr>
<tr><td colspan="2">Picture Tube</td><td colspan="17">10.4″ LCD(LED backlight ,32 bit TFT color LCD)</td></tr>
<tr><td colspan="2" rowspan="2">Range Scale(nm)</td><td colspan="17">KR-1338:36 nm
KR-1668:64 nm</td></tr>
<tr><td>0.125</td><td>0.25</td><td>0.5</td><td>0.75</td><td>1</td><td>1.5</td><td>2</td><td>3</td><td>4</td><td>6</td><td>8</td><td>12</td><td>16</td><td>24</td><td>36</td><td>48</td><td>64</td></tr>
<tr><td colspan="2">Range Ringe Interval</td><td>1/16</td><td>0.125</td><td>0.125</td><td>0.25</td><td>0.25</td><td>0.5</td><td>0.5</td><td>1</td><td>1</td><td>2</td><td>2</td><td>3</td><td>4</td><td>6</td><td>12</td><td>12</td><td>16</td></tr>
<tr><td colspan="2">Number of Rings</td><td>2</td><td>2</td><td>4</td><td>3</td><td>4</td><td>3</td><td>4</td><td>3</td><td>4</td><td>3</td><td>4</td><td>4</td><td>4</td><td>4</td><td>3</td><td>4</td><td>4</td></tr>
<tr><td colspan="2">Bearing Resolution</td><td colspan="5">4°</td><td colspan="12">1.9°</td></tr>
<tr><td colspan="2">Range Discrimination</td><td colspan="17">Better than 20 m</td></tr>
<tr><td colspan="2">Bearing Accuracy</td><td colspan="17">± 1°</td></tr>
<tr><td colspan="2">Minimum Range</td><td colspan="17">Better than 25 m</td></tr>
<tr><td colspan="2">Range Ring Accuracy</td><td colspan="17" rowspan="2">0.9° or 8m,whichever is the greater</td></tr>
<tr><td colspan="2">VRM Accuracy</td></tr>
<tr><td colspan="2">Input/Output Terminal</td><td colspan="17">NMEA (three input): NMEA 0183
NMEA (output) :NMEA 0183($RATLL, $RARSD, $RATLL: Internal easy ARPA version.)

External Buzzer (output) : +12 V source pulse Open Collector
Slave Display (output): TRU-HD, BP, TRU-TRIG, VIDEO</td></tr>
<tr><td colspan="2">Nav Data</td><td colspan="17">NMEA 0183 Format (••:any talker)
$••APB, $••BWC, $••BWR, $••DPT, $••GGA, $••GLL,
$••GLC, $••GTD, $••HDG, $••HDM, $••HDT, $••MDA, $••MTW,
$••RMA, $••RMB, $••RMC, $••VTG, $••VHW, $••XTE,</td></tr>
<tr><td rowspan="2">Compass safe Distance</td><td>Standard</td><td colspan="17">0.75 m</td></tr>
<tr><td>Steering</td><td colspan="17">0.6 m</td></tr>
</table>

KR-1338-SME-5

ENVIRONMENTAL CONDITIONS

		KR-1338	KR-1668
Ambient Temperature	Scanner Unit	-25℃ to +70℃	
	Display Unit	-15℃ to +55℃	
Humidity		Relative humidity 93% ± 2% or less at +40℃ ± 3℃	
Vibration		-IEC 60945	

KR-1338-SMJ-6

POWER SUPPLY & POWER CONSUMPTION

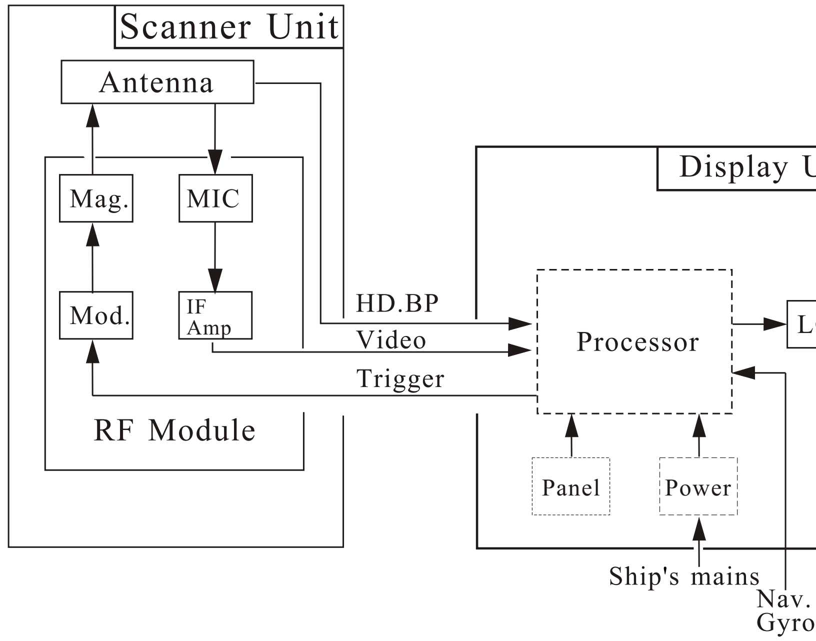
	KR-1338	KR-1668
DC Power	10.5 V to 40.0V	
	48 W approx	56 W approx

KR-1338-SME-7

2. BLOCK DESCRIPTION

2.1 Overview

The simpified block diagram of the system is illustrated below.



TX

The trigger pulse from the PROCESSOR Board is delivered to the MODULATOR Board, oscillates the magnetron, and then radar wave is emitted from the radiator.

RX

The 9.4 Ghz echo signal received by the antenna is converted to 60 Mhz signal by the MIC, amplified by IF Amp, and fed to the PROCESSOR Board as video signal. It is digitally processed and then displayed on the LCD.

2.2 Display Unit

Power Supply Circuit (PWR 0913)

The constant voltage generator Q1 is in operation even when power switch is off, ship's mains is supplied. The power supply circuit is basically consists of a main inverter and a sub inverter. The main inverter derives the isolated line voltages +12 V/ANT+12 V and -12 V/ANT -12 V from the main input. The sub inverter derives +5 V and +32 V from +12 V output of the main inverter.

Main inverter

The PWR switch becomes "open" when it is set to on position.

When the PWR switch is pressed, about 9 V is input via PWR line (P1302 #13), Q2 is on, and DC+10 V is applied to the PWM.

When power is supplied to the PWM controller, it starts operation and alternately turns on and off two switching FETs Q3/Q4 connected to the primary widing of T1. The resultant AC voltage obtained on the secondary windings are rectified and smoothed to +12 V and -12 V, and delivered to various circuits in the equipment. The voltage taken from the +12V line is fed back to the PWM controller through the Vr1 to maintain the +12 V output constant.

Sub inverter

U5 and the associated circuit form a PWM switching regulator for +5V and +32V. The voltage taken from +5 V line is fed back to U5 through R37 resistance to maintain the +5 V output constant.

Protectors

Protection of power supply circuit is achieved by stopping the drive signals to the switching FETs Q3/4.

Qverload on +5 V and + 32 V line is detected by U6. Overload on +12 V(MOTOR+) line is detected by U7. When the +5 V and + 32 V line is reduced by a heavy load, U6 or U7 becomes condctive and consequently disables the PWM controller thro- ugh Q6, Q7 and Q8. Overcurrent on the main input line is detected by R13, R14 and R15. The voltage drop across Q6, Q7 and Q8 bec- omes large when the inve- rter is overload. Overcurrent detector U3 disables PWM inverter U2 when the voltage drop exceeds a certain level.

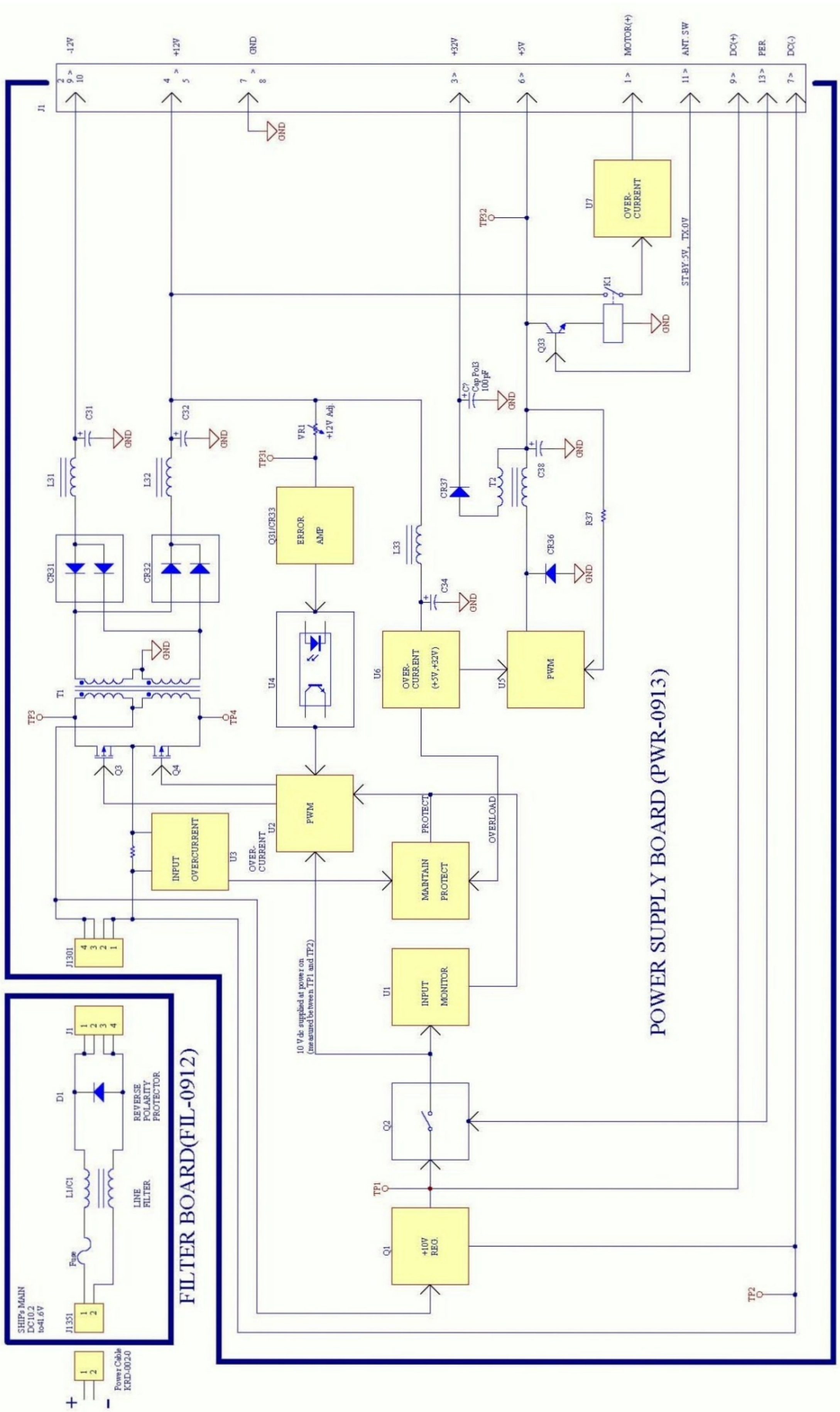
Overvoltage of mains input is detected by the U1. When the input voltage exceeds 41.6 V, the U1 becomes active and disables PWM controller U2

Scanner motor power (ANT+12V/ -12 V)

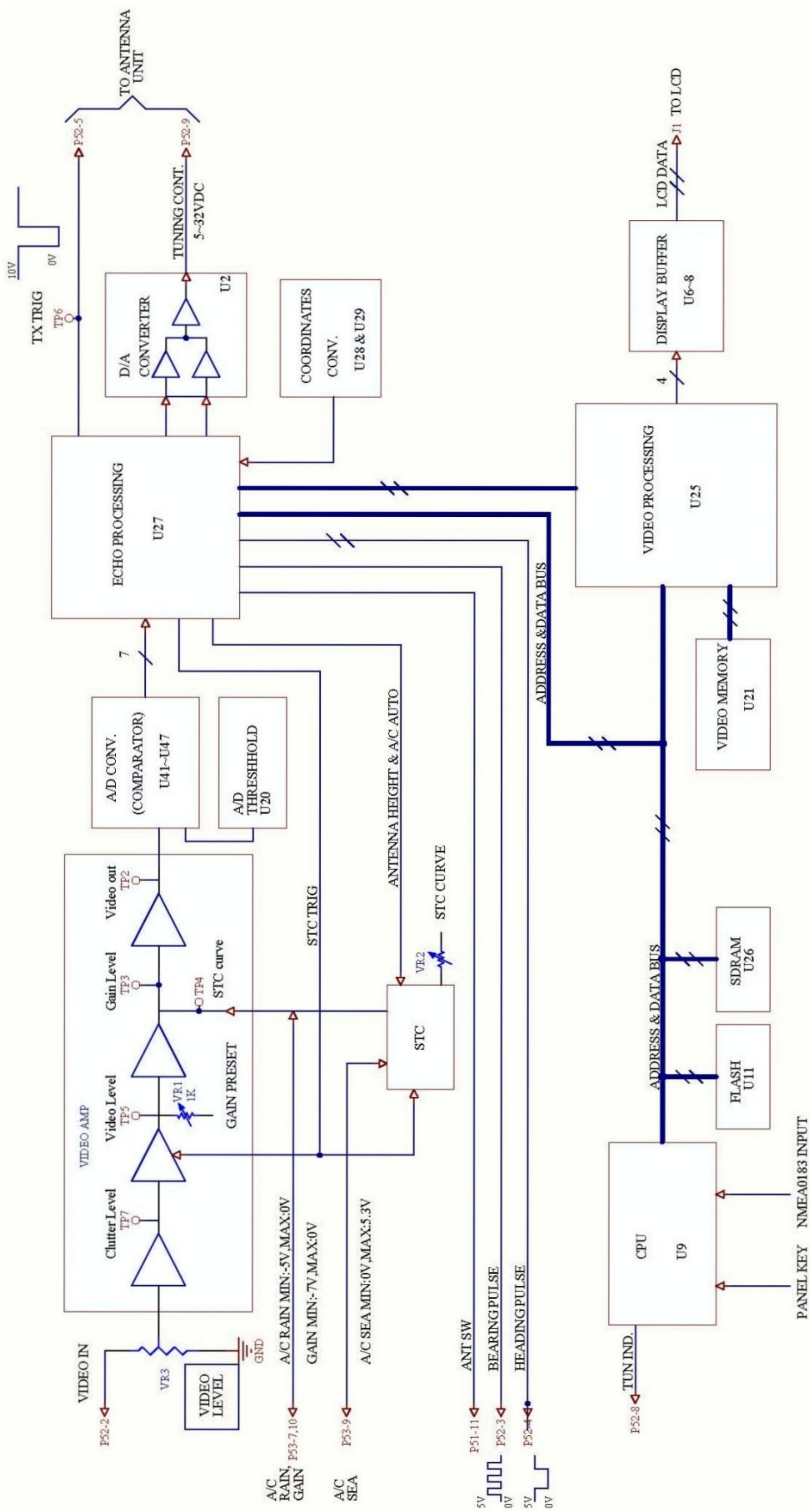
+12 V and -12 V (ANT +12 V/ANT -12 V) are used to drive 24 V scanner motor. The power to the motor is turned on/off by the relay(K1) on the POWER SUPPLY Board. The relay control signal from the SPU Board is supplied to Q52 and Q53 on the POWER SUPPLY Board. Pressing the TX key changes the ANT SW signal state from 5 V to 0 V, and K1 is on to supply +12V.

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BLOCK DIAGRAM OF POWER SUPPLY



BLOCK DIAGRAM OF PROCESSOR PCB MAIN 0910



AUTOMATIC TUNING

There are two types of automatic tuning: peak search and short search. The tuning voltage differs from model to model.

KR-1338/1668 : 5 V to 28 V

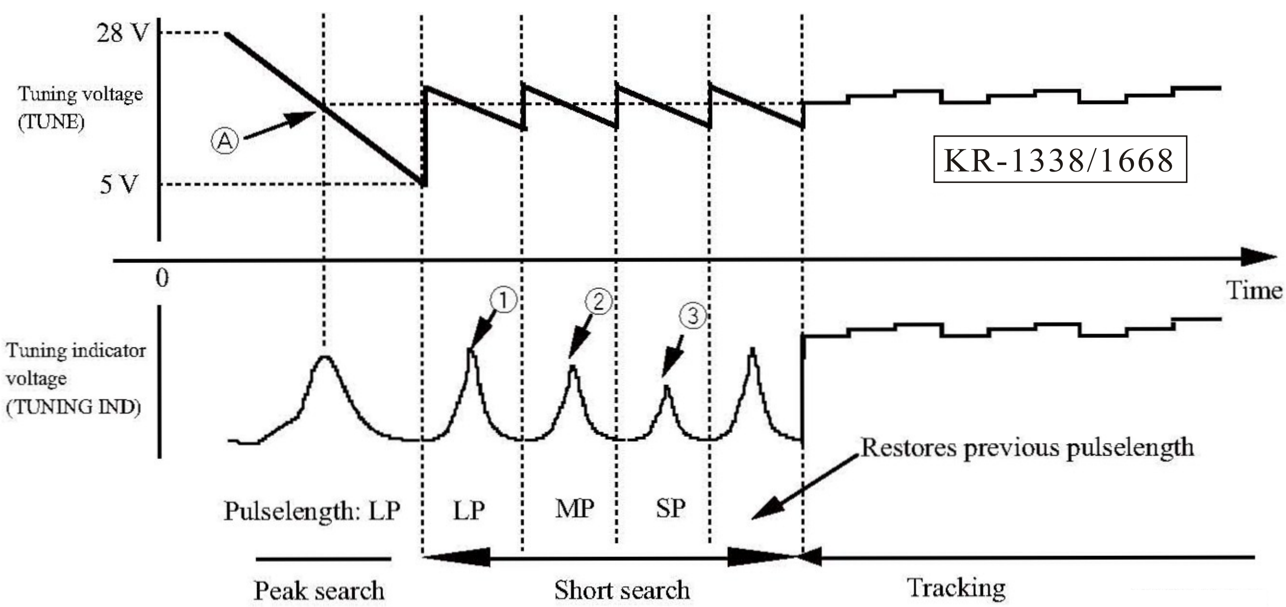
Peak search: Tuning voltage (TUNING), point in the figure below, is searched in the tuning voltage range 5V to Ⓐ 28V. Tuning Indicator voltage (TUNING IND) is maximum at point .

Search conditions: After initial tuning adjustment.
Search time: 3 sec approx

Short search: Maximum tuning indicator voltage Ⓐ is searched in the tuning voltage range of ±2.5V.

1)After initial tuning adjustment.
2)When tuning method is switched from manual to automatic.
3)When the radar is switched from ST-BY to TX.
4)When a range where pulselength is changed from short to middle and from middle to long is selected.

Tracking: After short search, tracking takes place.
Tracking voltage: 0 V to 32 V



TUNING INDICATOR

After tuning adjustment, peak TUNING IND voltages,①,②and ③in the figure on page 2-5 are stored on to EEPROM.

The automatic and manual tuning point Ⓐ is also memorized. Using these data, the tuning indicator extends more than 80% on ALL TX pulses.

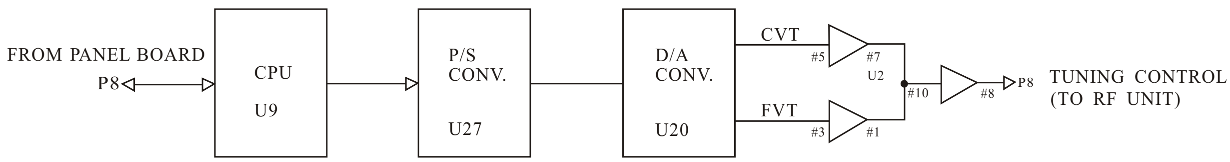
Note that the extension on short pulse is shorter than on long pulse. The indication becomes shorter with the magnetron deteriorated.

MANUAL TUNING

The manual tuning voltage changes from 5 to 32 V on M 1668 at the steps of about 0.1 V.

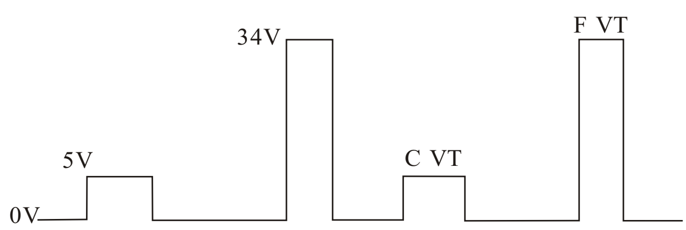
Manual Tuning is carried out by using omnipad: pressing "Right" side increases.

The TUNING continue voltage displayed on the screen differs by about ±1V from the measured voltage at P52 # 9. Manual Tuning and tuning adjustment are required when automatic tuning is abnormal (that is ,low sensitivity).



TUNING CONT. Operation (from power-on stand-by)

A square wave is automatically output as a TUNING CONT signal during stand-by just after power-on the model as follows.



KR-1838/1968/1948

Heading and NAV data

Heading data in NMEA format HEADING DATA (HDT, HDG, HDM, VHW)and NAV data (NMEA-0183)can be input from any NMEA input connection. THE data from the KEY board(KEY 0912) to P8#3 of MAIN board .

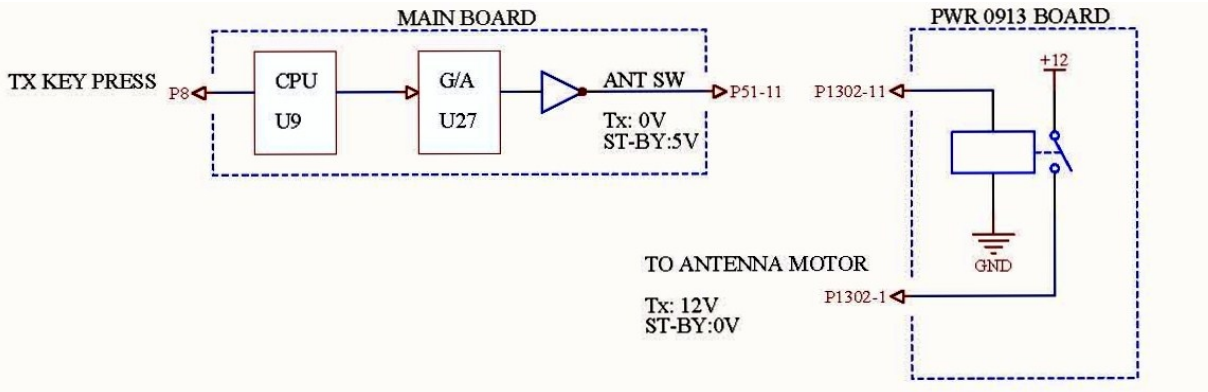
NOTE:

1.If only one NMEA signal input may select any connection, if several connections have time the signal input, be please main and the most commonly used signal meets in the connection 1, because the complete signal's input is 1 comes the synchronization by the connection, i.e. the connection 1 signal is fastest;

2.The NMEA signal after or before radar starting in may, but in signaling process, if the NMEA port 1 loss of signal, will possibly cause other port data not to be able to transmit normally. Must remove this kind of condition only to be able again starting.

Turning on/off antenna rotation

The SPU board controls antenna rotation. In normal operation, the antenna rotates during the TX condition. However, the antenna can be stopped during the TX condition thru the Installation setup menu.



2.3 Transceiver Unit

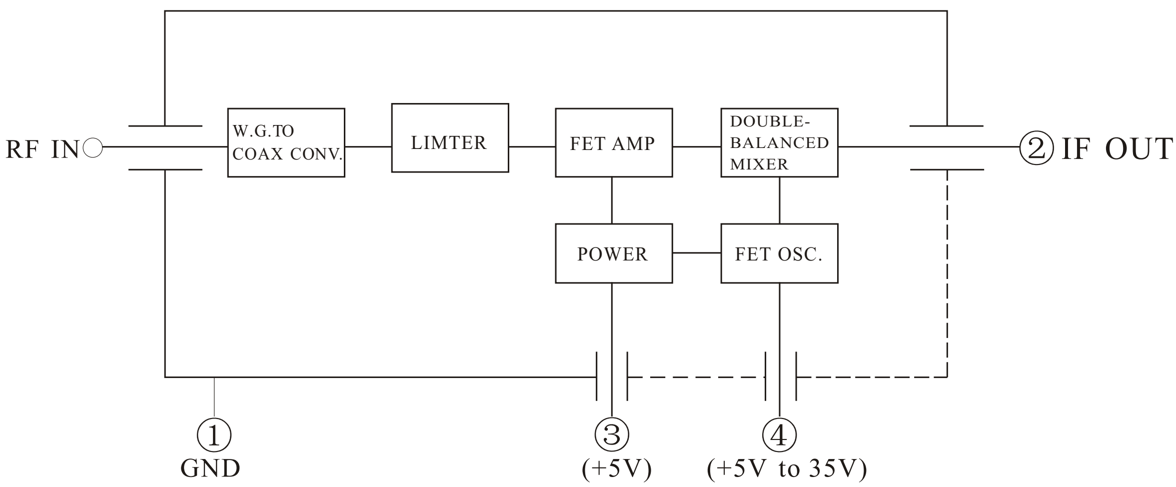
MIC

The following description is for reference only.

As a general rule of thumb, the radar requires better noise figure (NF) and better dynamic range. Both factors, however, are reciprocal. The NF affects long range performance, while the dynamic range dose short range performance.

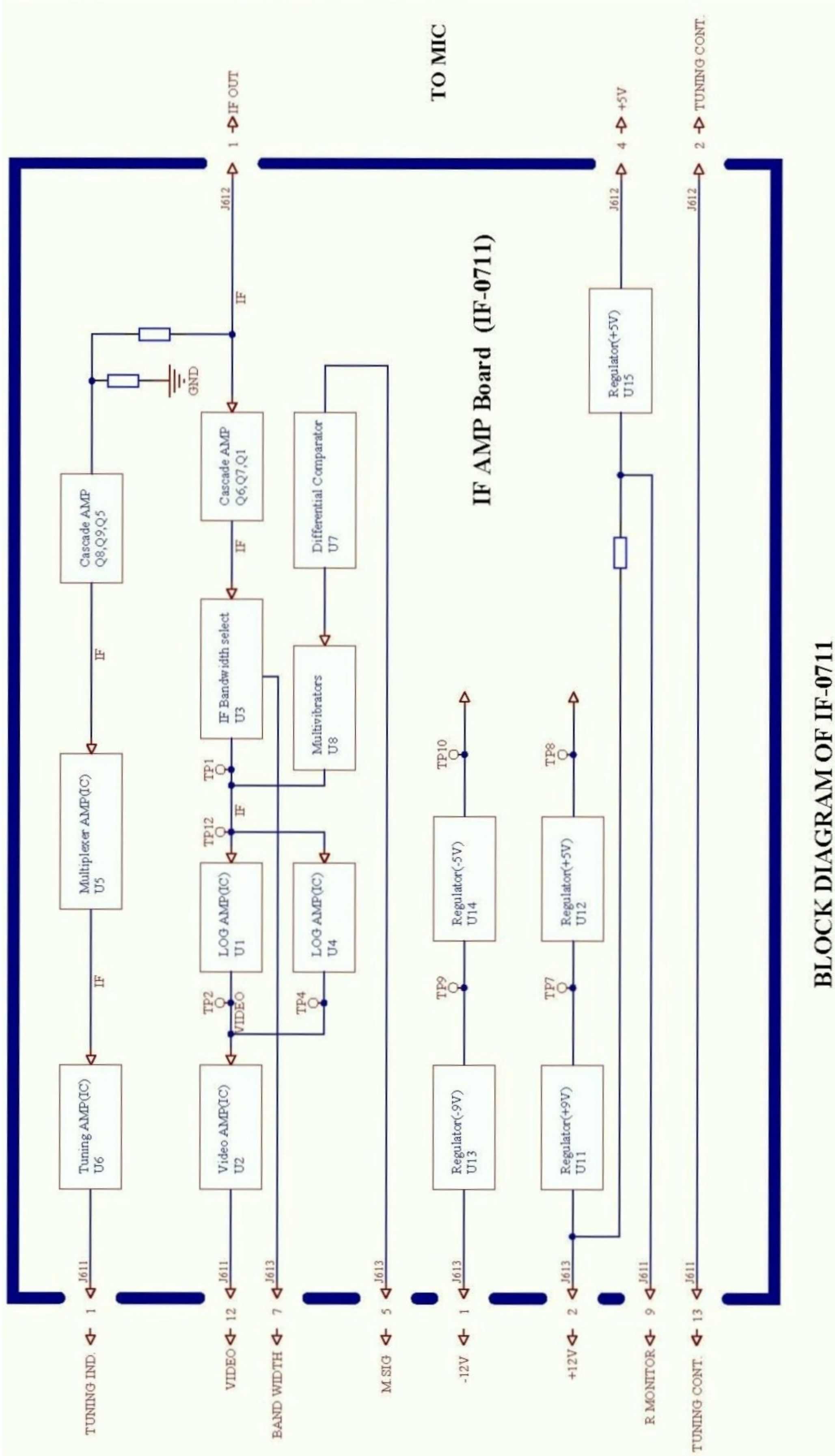
To improve noise figure, amplifier and MBS circuit into the MIC, RU-9360.

MIC w/RF amplifier……NJT-1968B(MODEL 1338/1668)



Block Diagram of MIC NJT-1968B (MODEL 1338/1668)

BLOCK DIAGRAM OF IF 0711

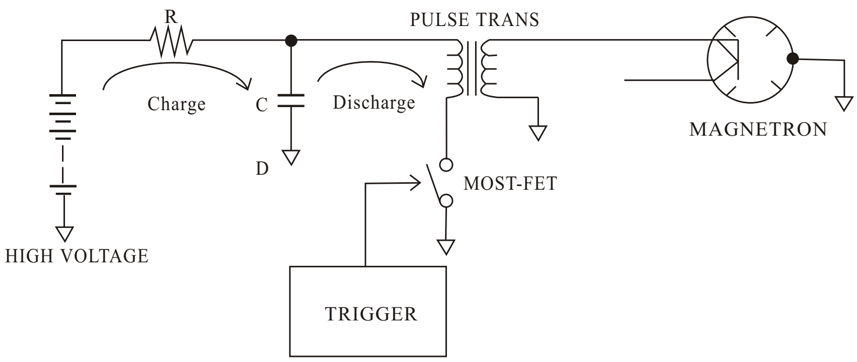


Modulator

PRINCIPLE OF FET SWITCHING MODULATOR

High voltage is charged into C through R while the magnetron is inactive.
When the trigger is applied to the power MOS-FET, the FET turns on and the high voltage appears at the primary winding of the pulse transformer. This transformer boots the voltage, which makes the magnetron oscillate.

One advantage of this method is that the magnetron oscillates only when the FET is conducive, that is the transmission pulsewidth can be changed by the TX trigger pulsewidth. Therefore, parts such as relay and coil can be eliminated.



Modulator section simple block diagram

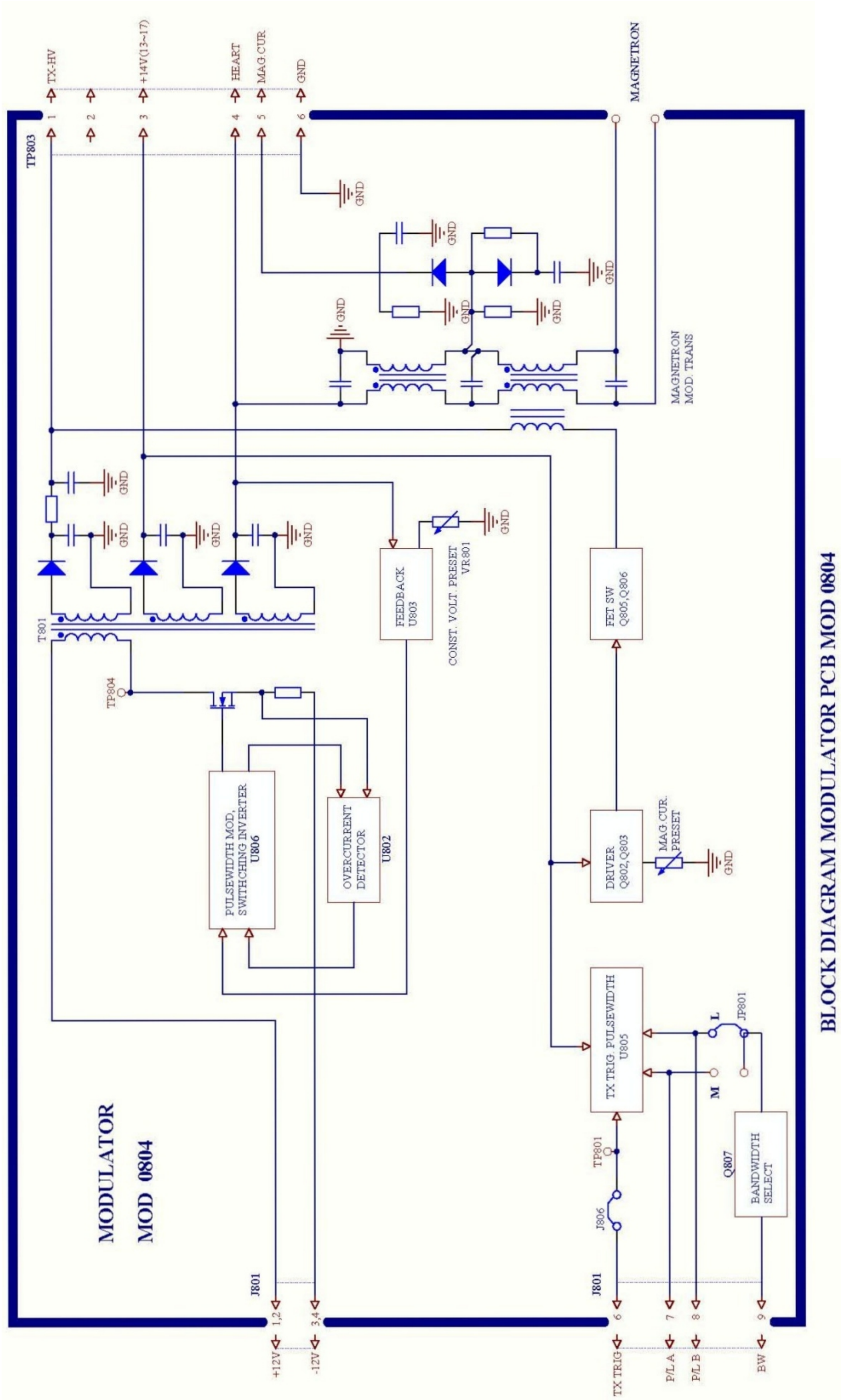
MODULATOR BOARD MOD-0904

The main function of the modulator section is to produce high voltage pulses to drive the magnetron. To produce these pulse, the MODULATOR Board has a modulator trigger circuit, modulator pulse generator and booster pulse transformer.

The modulator trigger circuit consists of U805 and associated components. This circuit generates the pulses which cause modulation FETs Q805,Q806 to conduct. The pulses are produced when the TX TRIG pulses from the display unit is received and U805 conducts. The voltage of the pulses is raised at pulse transformer T802 until it is 3.5 kV. This circuit adjusts the electrical curent flowing into the magnetron so it is 3 A.

The MODULATOR Board also contains the TX high voltage circuit and the magnetron heater circuit. The TX high voltage circuit charges capacitors with 300 V high voltage produced at the primary windings of T801 and discharges them once the TX TRIG pulse is received. The magnetron heater circuit produces stable +7.5V.

BLOCK DIAGRAM OF MODULATOR PCB MOD 0904



2.4 Different Points of Similar PCBs

1. How to set SPU (MAIN 0910) Board

This board is set at factory for use in the KR-1338. For use in the or 1668, change the factory menu as below.

While pressing and holding down the GAIN(HM-OFF) control, press the [MENU] key five times to display the factory menu.

[Factory MENU]

1. Max Range	36 48 64
2. Type	R G N K
3. Model	KR-1338 KR-1648 KR-1668
4. Language	ENG CHN
5. Default Setting	ENTER×3

<Press MENU key to escape >

M1338-SME-09D

1) MAX range

36 nm: KR-1338,   48 nm: KR-1648,   64nm: KR-1668

2) Type

R: Regular,   G: German,   N:Netherland,   K:Korea

3)Model

Selects the Antenna Unit.

KR-1338   KR-1648   KR-1668

4)Language

CHN: Chinese   ENG: English

5)Default Setting

Default settings (except factory menu) can be restored by selecting Default Setting and pressing the [ENTER] key three times. Restart radar settings. After changing the setting, the installation adjustment (heading, timing, etc.) Must be carried out again.

2.MODULATOR board MOD-0904 A/B

E version of MOD-0904 is not compatible with A version. This is because B has a larger pulse transformer.

3. ADJUSTMENT

WARNING

IMPORTANT! SAFETY INFORMATION
Be sure to read all the safety information which follows before perfoming any adjustment.

Hazardous Voltage

This equipment uses high voltage electricity which can SHOCK, BURN or cause DEATH Always make sure the electrical power is turned off before attempting to change a component or inspecting the inside of the equipment. A residual charge may exist in capacitors, even with the equipment turned off. Always short all supply lines to the chassis with an insulated screwdriver or a similar tool before touching the circuit.

Working on the Scanner Unit Mast

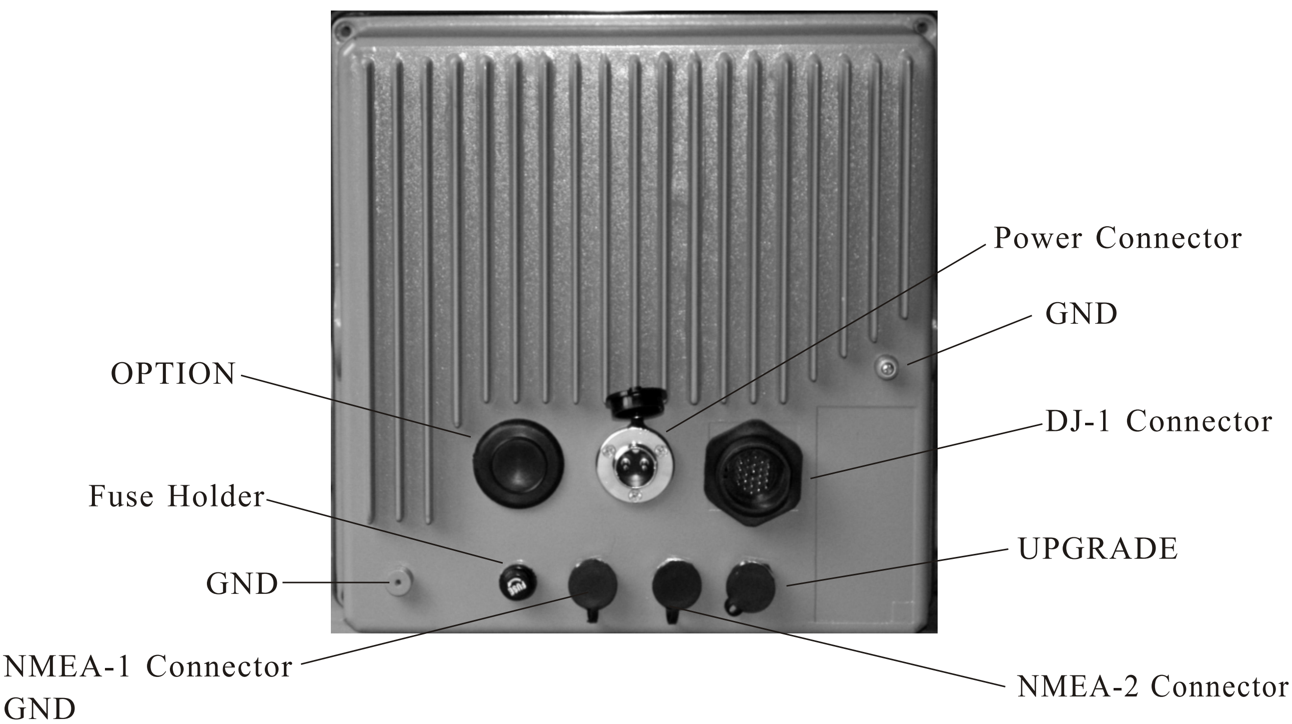
Work on the scanner unit mast in dangerous, and doubly so if the proper precautions are not taken.

1. Post an appropriate warning sign near the display unit to indicate that work on the scanner unit is being performed, to prevent accidental application of the power to the scanner unit.
2. Wear a safety helmet and always be aware of where the scanner radiator is.

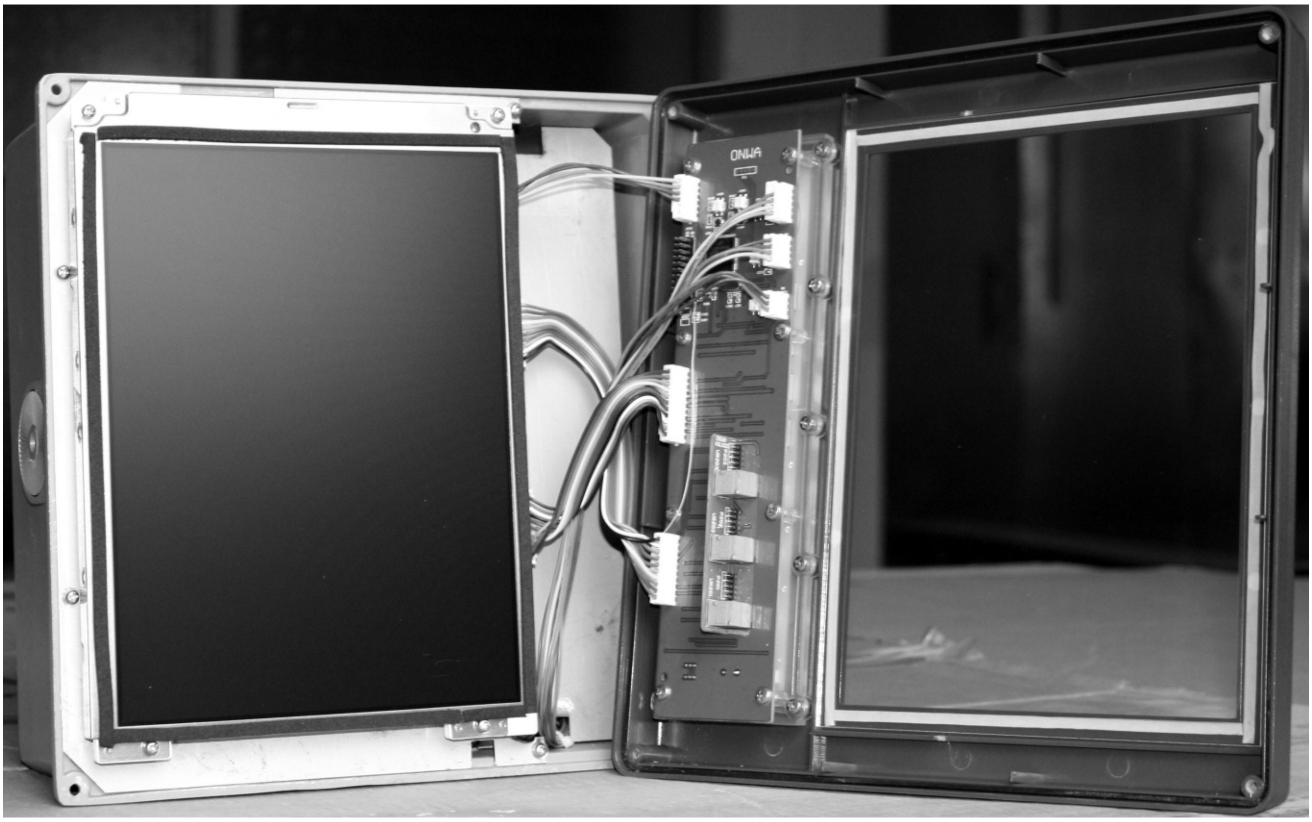
3.1 Adjustment of Display Unit



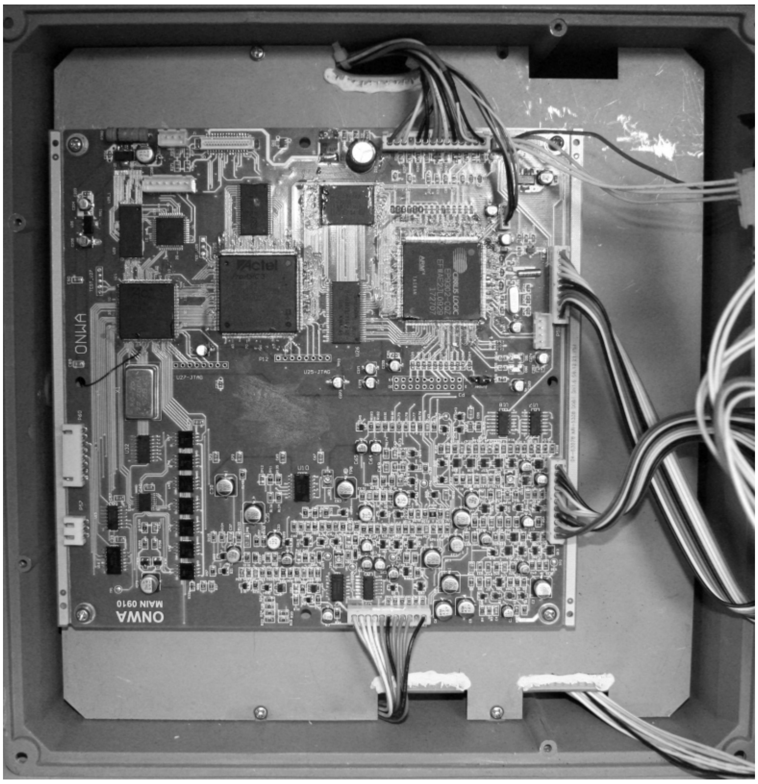
Display Unit, Front side of view



Display Unit, Rear side of view



Inside of Display Unit, LCD



Inside of Display Unit, Processor PCB



Inside of Display Unit, Power PCB

Line Voltage

Item	Ratings	Test Point	Remarks
+12 V	12.1 to 12.3 V	DJ1-10(+)-DJ1-20(-)	ST-BY
+5 V	4.9 to 5.1V	DJ1-23(+)-DJ1-20(-)	
+12 V	-11.6 to -12.8 V	DJ1-14(+)-DJ1-20(-)	
ANT 12 V	12.0 to 12.3 V	DJ1-1(+)-DJ1-20(-)	

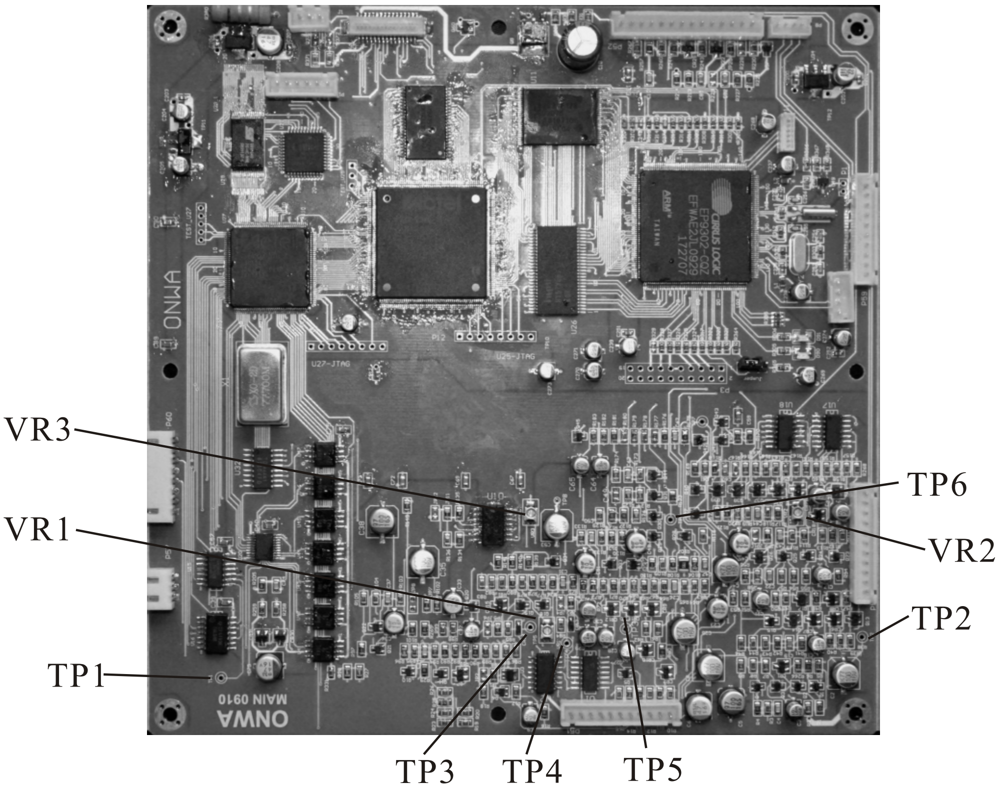
KR-1338-SME-8

Output signals from DJ-1 connector

Test Item	Ratings	Test Point	Remarks
TUNE	Approx. 5 V to 28 V(KR-1338/1948/ 1968)	DJ1-6(+) -DJ1-20(-)	Antenna Unit discon-ected TX, Auto tuning
P/L A	Short pulse: 0 to 1.0V(L) Medium pulse:7 to 12 V(H) Long pulse: 7 to 12 V(H)	DJ1-8(+) -DJ1-20(-)	Antenna Unit discon-ected Tx condition
P/L B	Short pulse: 0 to 1.0V(L) Medium pulse:0 to 1.0 V(L) Long pulse: 8 to 12 V(H)	DJ1-7(+) -DJ1-20(-)	
TRIGGER	Short pulse: 2000 to 2300 Hz Pulsewidth: 10 to 20 us (All range) Polarity: Positive Polarity 8 to 12 V(H)	DJ1-2(+) -DJ1-20(-)	

KR-1338-SME-9

Location of parts on MAIN 0910



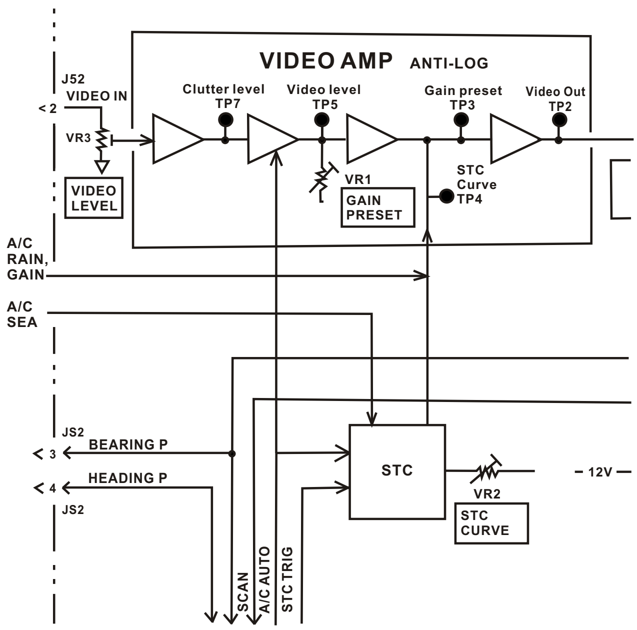
MAIN 0910 Board

Test Point on MAIN 0910

Test Point	Test Item	Ratings	Remarks
TP1	TRIGGER	3.3 Vpp	
TP2	VIDEO	-4 Vpp	TX Condition
TP3	Gain level preset	后详	
TP4	STC Curve	4US: 1.0V to 1.2V 20US: 2.0V to 2.3V 40US: 2.6V to 2.8V 60US: 3.0V to 3.2V 90US: 4.0V to 4.5V	TX Condition GAIN VR: MAX STC VR: MAX
TP5	VIDEO Preset	-4 Vpp (Neg. Polarity, main bang level)	TX Condition
TP6	TX TRIGGER	8 to 12V	

VIDEO Signal adjustment

VIDEO signal adjustment is carried out in the processor board. This is a simplified block diagram of the video amplified circuit.



Video level

<u>Conditions</u>

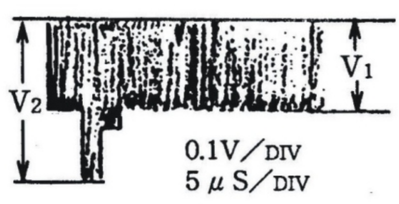
A/C AUTO………… OFF

A/C SEA…………… fully counterclockwise

A/C RAIN…………… fully counterclockwise

TX on 12 nm

<u>Table 3-5 video level</u>

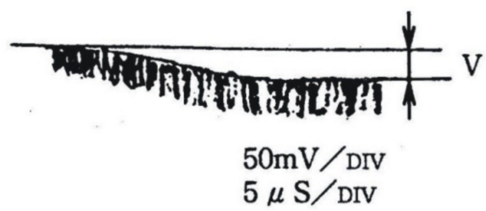
Check Point	Rating	Adjuster
TP5 on SPU pcb (trigger at TP1)	 V_1 = 500 to 700 mV V_2 = 4.2 ±0.2V	VR3

Gain preset

Conditions

A/C AUTO··········· OFF
A/C SEA············ fully clockwise
A/C RAIN··········· fully counterclockwise
GAIN················ fully Clockwise
Scanner ············ OFF
[INSTALLATION SETUP 1] menu
"4. Ant on Tx" : "STOP"

Table 3-6 Gain preset

Check Point	Rating	Adjuster
TP3 on SPU pcb (trigger at TP1)	 V = 0.04 to 0.06V	VR1

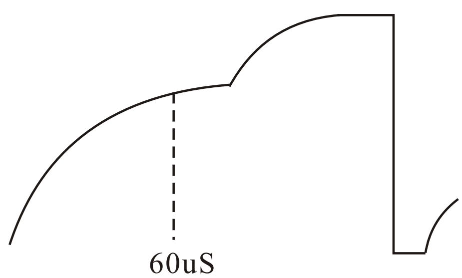
STC curve

Conditions

A/C SEA············ fully clockwise
GAIN················ fully Clockwise
TX on 12nm

Table 3-7 STC curse

Check Point	Rating at 60 uS point	"Ant Height" on Installaion Setup menu	Adjuster
TP4	3.1 ± 0.1V	"MED"	VR2
	3.6 ± 0.2V	"LOW"	
	2.5 ± 0.2V	"HIGH"	



ANT height setting

Antenna height (STC curve adjustment) should be set Radar at installation to match the STC curve with installation conditions. This is especially important when sea conditions changes over time - rotation of the STC VR may erase both sea clutter and legitimate targets if the STC curve is not suitable.

Setting in the field

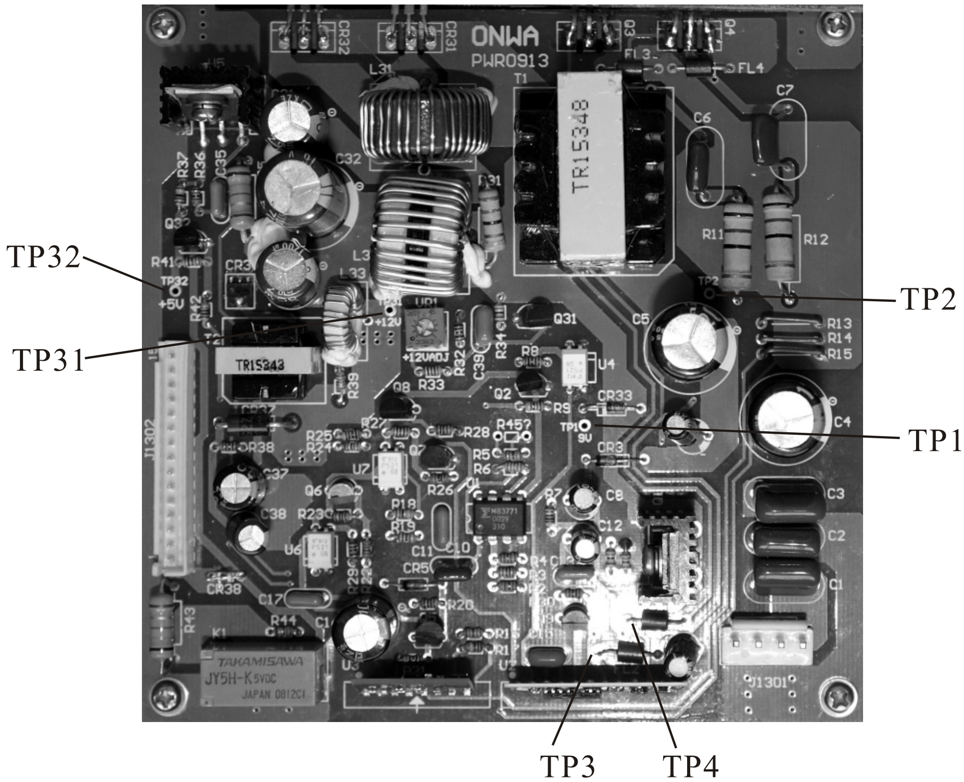
1. Set antenna height on the Installation Setup 1 menu If both sea clutter and echoes disappear, decrease antenna height setting. If sea clutter cannot be completely eliminated, increase antenna height setting.

2. Adjust Vr2 on the SPU board. If both sea clutter and targets disappear: increase voltage at 60 us point.

Note: The following step, adjustment of the STC, should only be followed when step 1 and 2 do not produce satisfactory results. Record the factory setting before adjusting the STC.

3. Adjust STC. (Press the MENU key five times while pressing and holding down the HM OFF control to display the FACTORY menu. Operate the trackball to change the maximum effective range of the STC.

Location of parts on PWR-0913



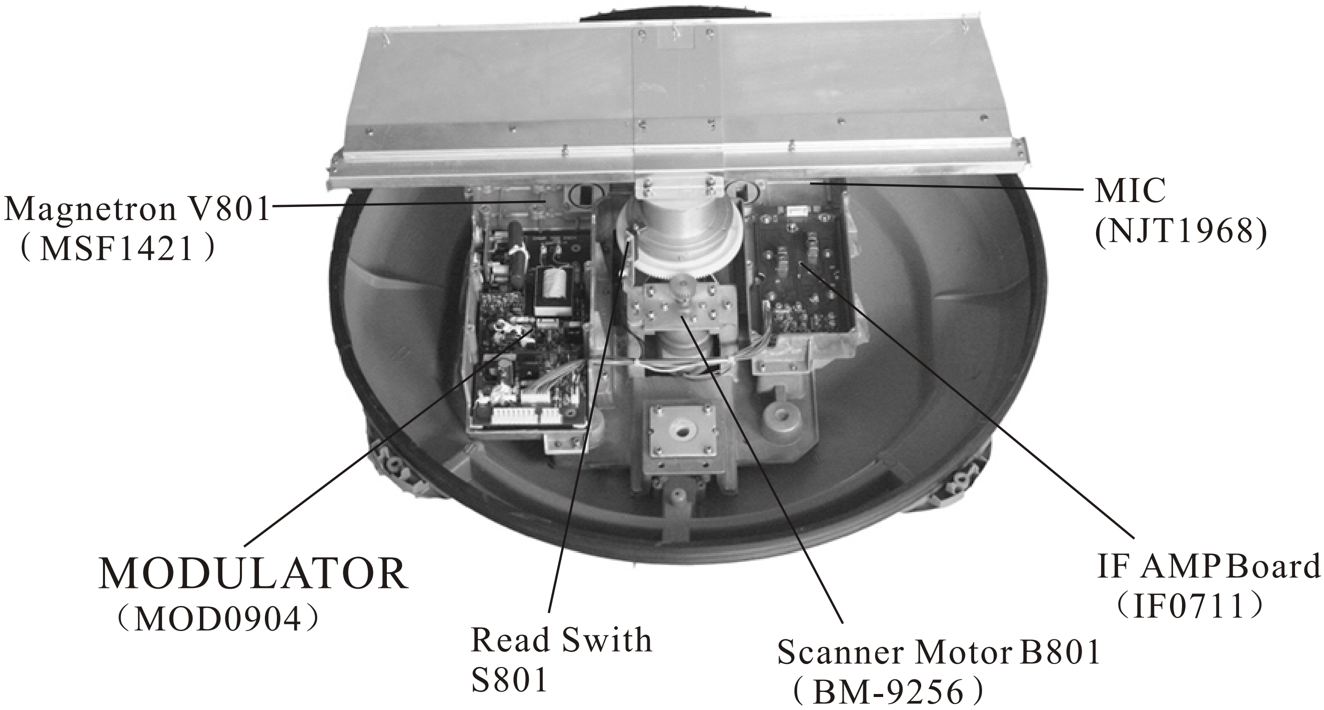
Test point on PWR-0913

Test Point	Test Point	Test Point	VR No	Remarks
TP1	+10 V	8.2 to 9.5 V	—	—
TP2	DC(-)	—	—	—
TP3	Inverter Frequency	85.5 to 94.5 KHz	—	—
TP4				
TP 31	+12 V	12.1 to 12.3 V	VR 1	—
TP 32	+5 V	4.9 to 5.2 V	—	—
J1 #2(-) J1 #7(GND)	+12 V	-11.6 to -12.8 V	—	—
J1 #3(+) J1 #7(GND)	+32 V	30.0 to 35.0 V	—	—

KR-1338-SME-11

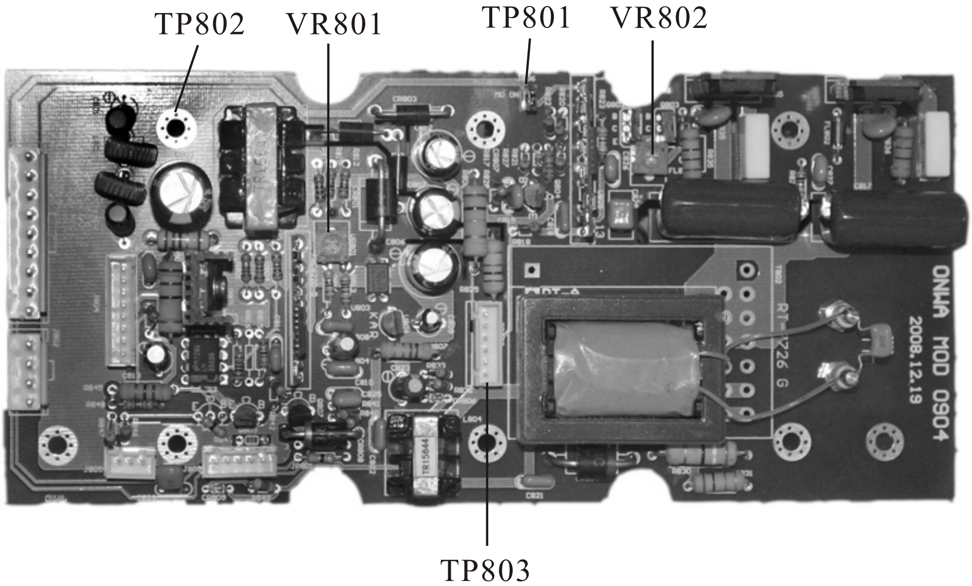
3.2 Adjustment of Scanner Unit

Location of PCBs in Scanner Unit（KR－1338）



Inside of Scanner Unit

Location of parts on MOD-0904A

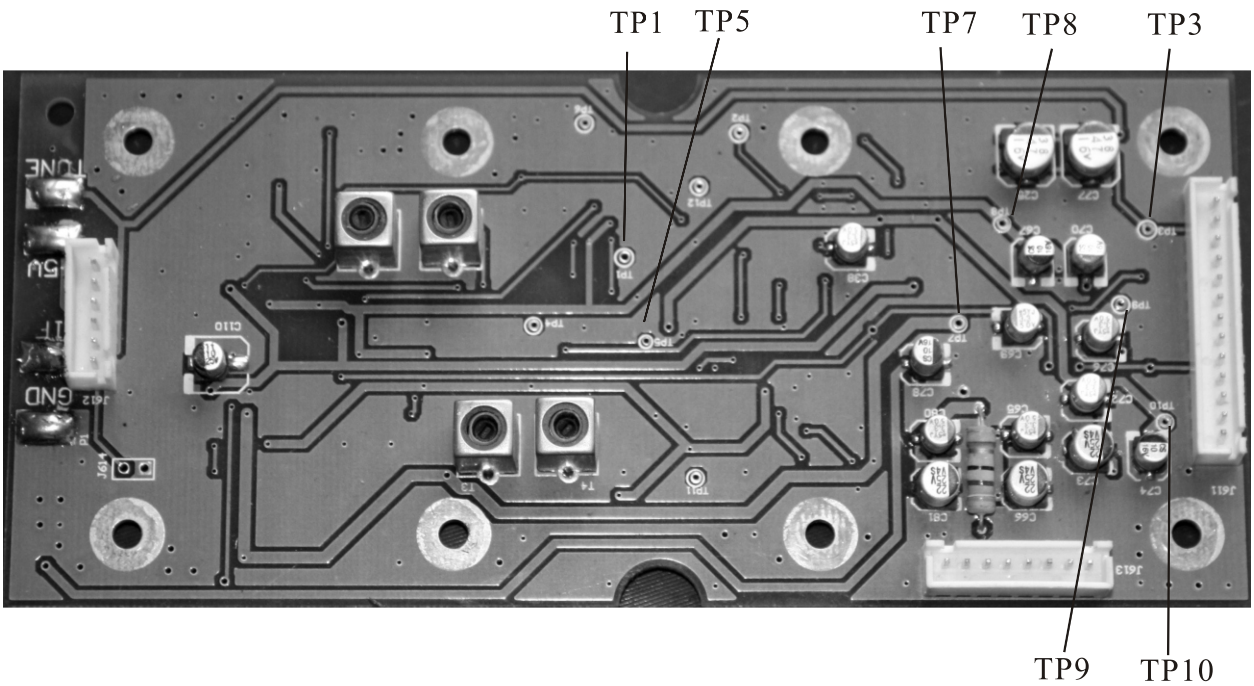


Test point on MOD-0904 A

Test Point		Test Item	Ratings	VR No	
TP 801		TRIGGER	Same as MAIN 0910 TP6 in Display Unit	–	TX Condition
TP 802		GND	–	–	–
TP803	#1	TX-HV	ST-BY: 300 to 370 Vdc TX: 290 to 330 Vdc(Long)	–	–
	#2	GND	–	–	–
	#3	+14V	13 to 17 Vdc	–	ST-BY
	#4	Mag. Heater	7.4 to 7.6 Vdc	VR801	ST-BY
	#5	Mag. Current	0.25 to 1.2 Vdc(Short) 0.7 to 1.2 Vdc(Medium) 0.9 to 1.1 Vdc(Long)	VR802	TX (Long) Condition
	#6	GND	–	–	–

KR-1338-SMC-12

Location of parts on IF-0711

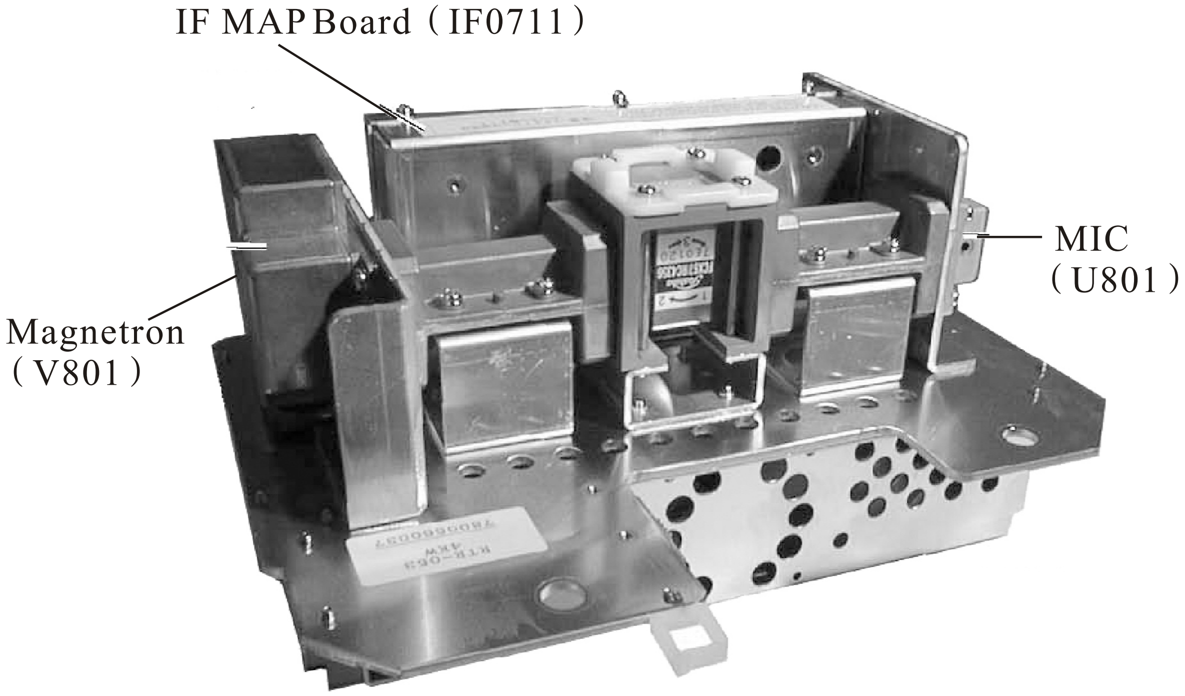


Test point on IF-0711

Test Point	Test Item	Ratings	VR No	Remarks
TP 1	Center Frequency correction	For factory adjustment	T1, T2	–
TP 3	VIDEO output	Same as MAIN 0910 TP5 in Display Unit	–	–
TP 5	Tuning indicator	For factory adjustment	T3, T4	–
TP 7	+9 V	8.7 to 9.3 Vdc	–	–
TP 8	+5 V	4.7 to 5.3 Vdc	–	–
TP 9	-9 V	-8.7 to -9.3 Vdc	–	–
TP 10	-5 V	-4.7 to -5.3 Vdc	–	–

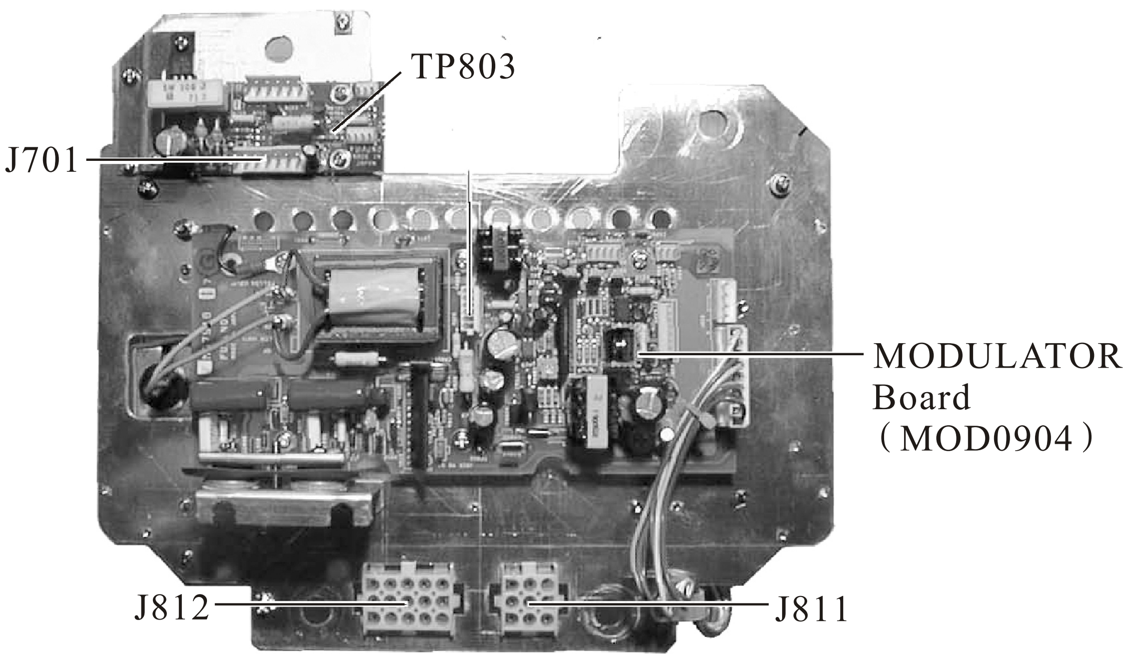
KR-1338-SME-13

Location of PCBs in Transceiver Module (KR-1668)



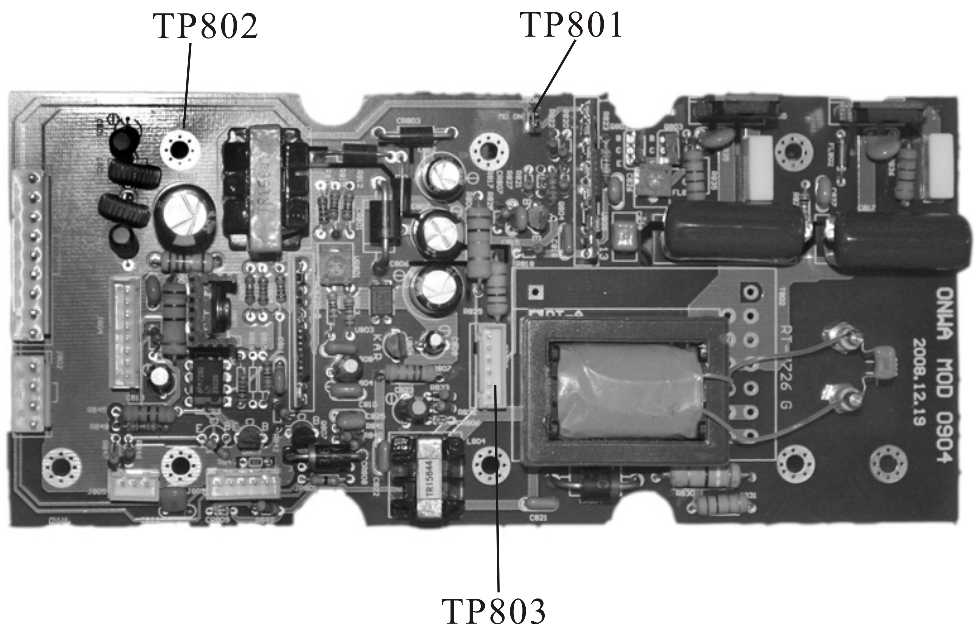
Transceiver Module

BEARING SIG GEN Board（HBP0904）



Transceiver Module, Cover removed

Location of Parts on MOD 0904B

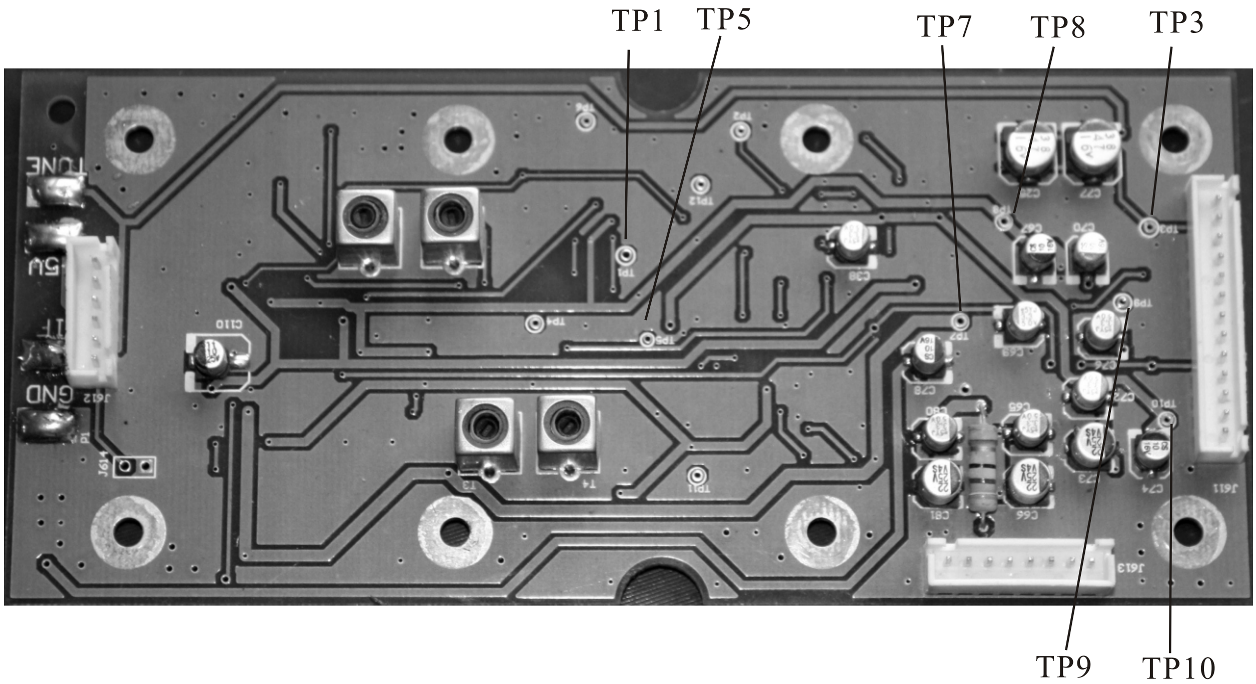


Test point on MOD 0904B

Test Point		Test Item	Ratings	VR No	
TP 801		TRIGGER	Same as MAIN 0910 Tp6 in Display Unit	–	TX Condition
TP 802		GND	350 – 390	–	–
TP803	#1	TX-HV	ST-BY: 300 to 370 Vdc TX: 300 to 340 Vdc(Long)	–	–
	#2	GND	–	–	–
	#3	+14V	13 to 17 Vdc	–	ST-BY
	#4	Mag. Heater	7.5 to 7.7 Vdc	VR801	ST-BY
	#5	Mag. Current	0.5 to 1.45 Vdc(Short) 0.95 to1 .46 Vdc(Medium) 1.15 to 1.35 Vdc(Long)	VR802	TX (Long) Condition
	#6	GND	–	–	–

KR-1338-SMC-14

Location of parts on IF-0711



Test point on IF-0711

Test Point	Test Item	Ratings	VR No	Remarks
TP 1	Center Frequency correction	For factory adjustment	T1, T2	–
TP 3	VIDEO output	Same as MAIN 0910 TP5 in Display Unit	–	–
TP 5	Tuning indicator	For factory adjustment	T3, T4	–
TP 7	+9 V	8.7 to 9.3 Vdc	–	–
TP 8	+5 V	4.7 to 5.3 Vdc	–	–
TP 9	-9 V	-8.7 to -9.3 Vdc	–	–
TP 10	-5 V	-4.7 to -5.3 Vdc	–	–

KR-1338-SMC-15

4. MAINTENANCE

4.1 Remarks on Replacement of Major Parts

Turn off the power before replacing any parts

Do not touch the magnetron while the radar is transmitting. Sufficient high voltage exsts at the magnetron to cause death.

MAGENTRON

The magnetron emits a strong magnetic field. For this reason, remove wrist watch before performing the replacement and use a non-magnetic screwdriver to dismount the magnetron. The estimated life of the magnetron is 2000 hours, (including time in stand-by), however actual life depends on usage.

1. Turn off the power.
2. Dismount the transceiver module.
3. Dismount and replace the magnetron.
4. When a new magnetron is fitted, allow at least 30 minute pre-heating under ST-BY. Turn on the power and measure magnetron current . See Chapter 3 for heater voltage rating and potentiometer to adjust.
5. Transmit on long range and measure magnetron current. See Chapter 3 for magnetron current rating and potentiometer to adjust.
6. Reset "TX Hours" and "On Hours" on INSTALLATION SETUP menu. See page 4-3 for how to access this menu.

MIC

The MIC can be replaced individually. No adjustment is necessary after replacement.

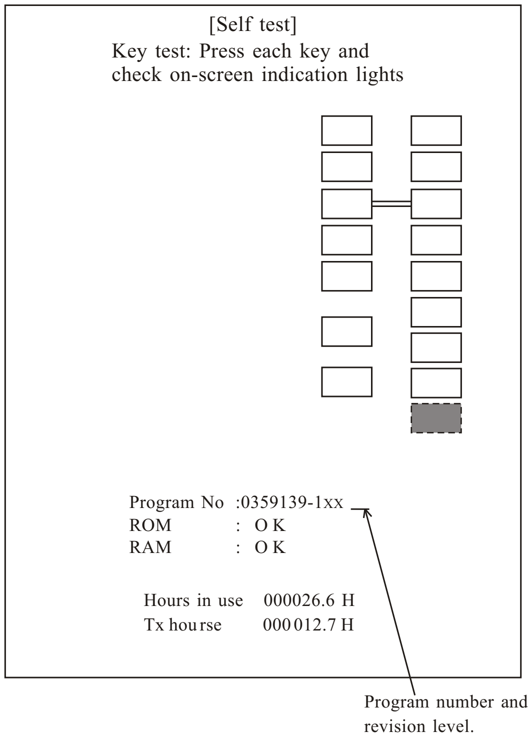
SPU Board

Write down settings of MAIN and INSTALLATION menus before replacing the board. Then, after replacing the board, reenter settings. (Reason: Settings are stored in the E^{2}PROM(U48) on the SPU board.)

IMPORTANT: After replacing the board, the factory menu setting must be carried out properly, otherwise the MIC will be damaged.

ROM

The SPU board uses Flush ROM(U36) to store a system program. The program version number can be checked at "23. Self Check" on the MAIN menu.



4.2 Life Expectancy of Expendable Parts

Parts	Type	Code No.	Life expectancy *1	Remarks
Scanner motor	BM-9256	000-139-918	more than 3000 hrs.	KR-1338
			.	
	BM-8256		more than 5000 hrs.	KR-1668
Magnetron	MSF1421		more than 2000 hrs.*2	KR-1338
	MAF1421		more than 2000 hrs.*2	KR-1338
	MAF1422		more than 2000 hrs.*2	KR-1668

KR-1338-SMC-16

*1: Under normal operating condition.

*2: Hours during ST-BY are included.

4.3 Menu tree

- MENU KEY
  - RINGS(Off,1,2,3,max)
  - EBL OFFSET（Off，On）
  - SHIFT（Off，On）
  - ZOOM（Off，On）
  - MODE（HU，CU，NU，TM）
  - DISP DATA
  - ECHO TARIL（Off，On）
  - ECHO STRTCH（Off，ES1，ES2）
  - ARPA MENU
    - 1.Display
    - 2.AllCancel
    - 3.Vectpr ref
    - 4.Vectpr Leng
    - 5.History
    - 6.CPA SET
    - 7.TCPA SET
    - 8.AUTO ACQ
  - OTHER MENU
    - 1.Panel Dimmer（1,2,3,4）
    - 2.Mark Brill（1,2,3,4）
    - 3.HD Mark（1,2,3,4）
    - 4.Characters（1,2,3,4）
    - 5.Trail Tone（Single，Muiti）
    - 6.Int Reject（Off，1,2,3）
    - 7.Pulselength（Short，Long）
    - 8.Noise Reject（Off，On）
    - 9.Trail Time（15S，30S，1M，3M，6M，15M，30M，Cont）
    - 10.Tone（Auto，Manu）
    - 11.Disp Data（Off，Nav，ARP，All）
    - 12.WPT Mark（Off，No）
    - 13.EBL Ref（Rel，True）
    - 14.VRM Unit（nm，km，sm）
    - 15.Watchman（Off，5M，10M，20M）
    - 16.STBY DISP（Norm，Econo，Nav）
    - 17.Guard Mode（In，Out）
    - 18.Cursor Posi（B/R,L/L）
    - 19.Alm Sense LV（Low，Mid，High）
    - 20.Dead Sector（Off，On）
    - 21.Range（1/8，1/4，1/2，3/4，1，1.5/2，3，4，6，8，12，16，24，
      - 36):1016
      - 36,48):1048
      - 36,48,64):1064
    - 22.Color Setting
    - 23.Self Test
    - 24.Installation Setup
      - 1.Nav Talker（All，GPS）
      - 2.Depth unit（m，fa，ft）
      - 3.Temp Unit（° C,° F)
      - 4.Hdg Sensor(Magnet,Gyro)
      - 5.Key Beep（Off，On）
      - 6.Scan Stop（Rotate，Stop）
      - 7.Dead Sector
      - 8.Tune/Video Adjustment
      - 9.Heading Alignment
      - 10.Sweep Timing Adjustment
      - 11.MBS Adjustment
      - 12.Ant Height（Low，Mid，High）
      - 13.STC Curve(Sharp,std，Gntl)
      - 14.Ope Mode（Master，Slave）
      - 15.Hours in Use
      - 16.TX Hours

5. TROUBLESHOOTING

5.1 Outline

This chapter provides troubleshooting flow charts and describes error messages.

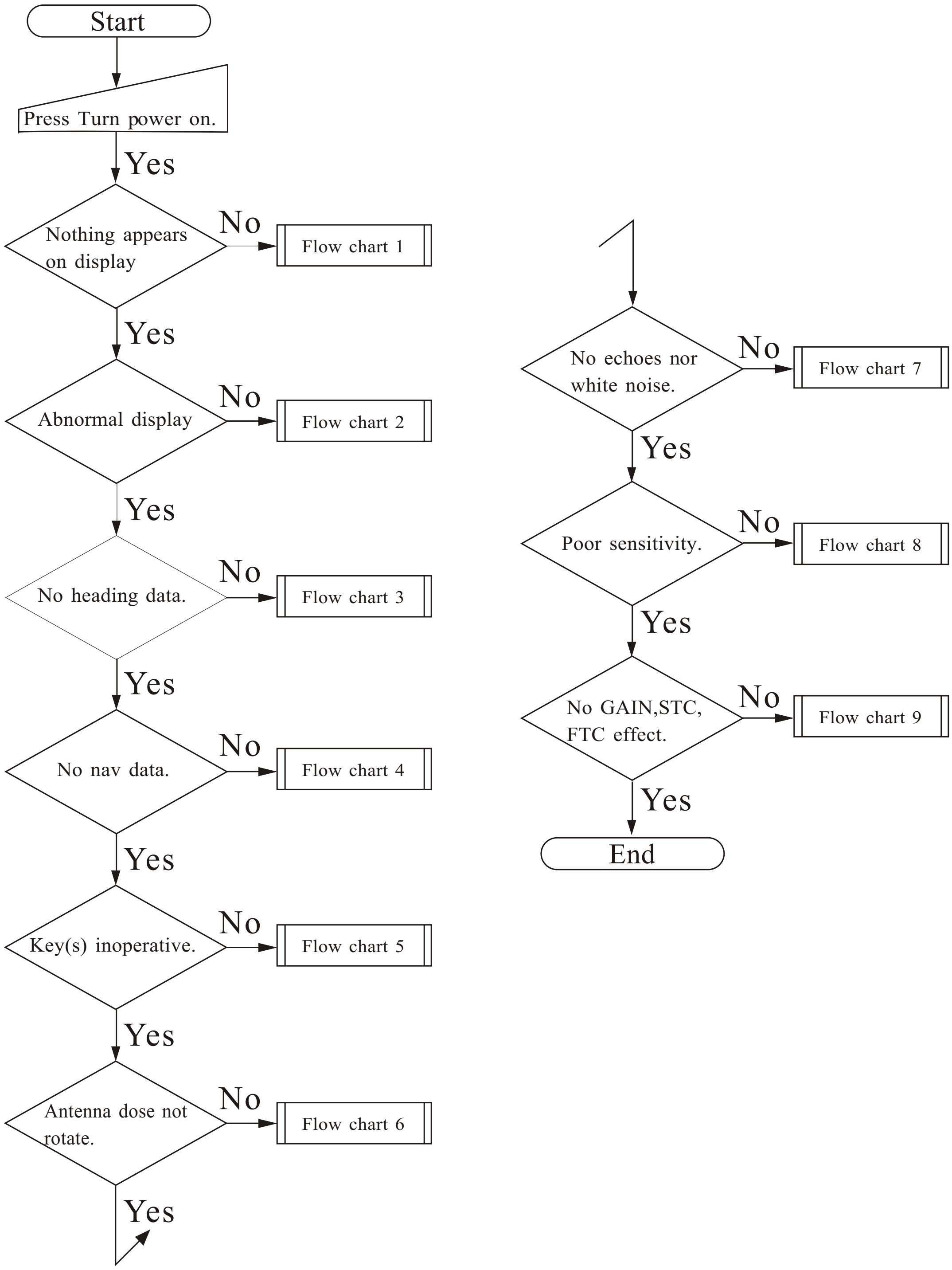
Error messages

When there is no bearing pulse signal the display unit shows BP-SIG-MISSING and when is no heading signal, HD-SIG-MISSING. Check the antenna cable when those indications appear.

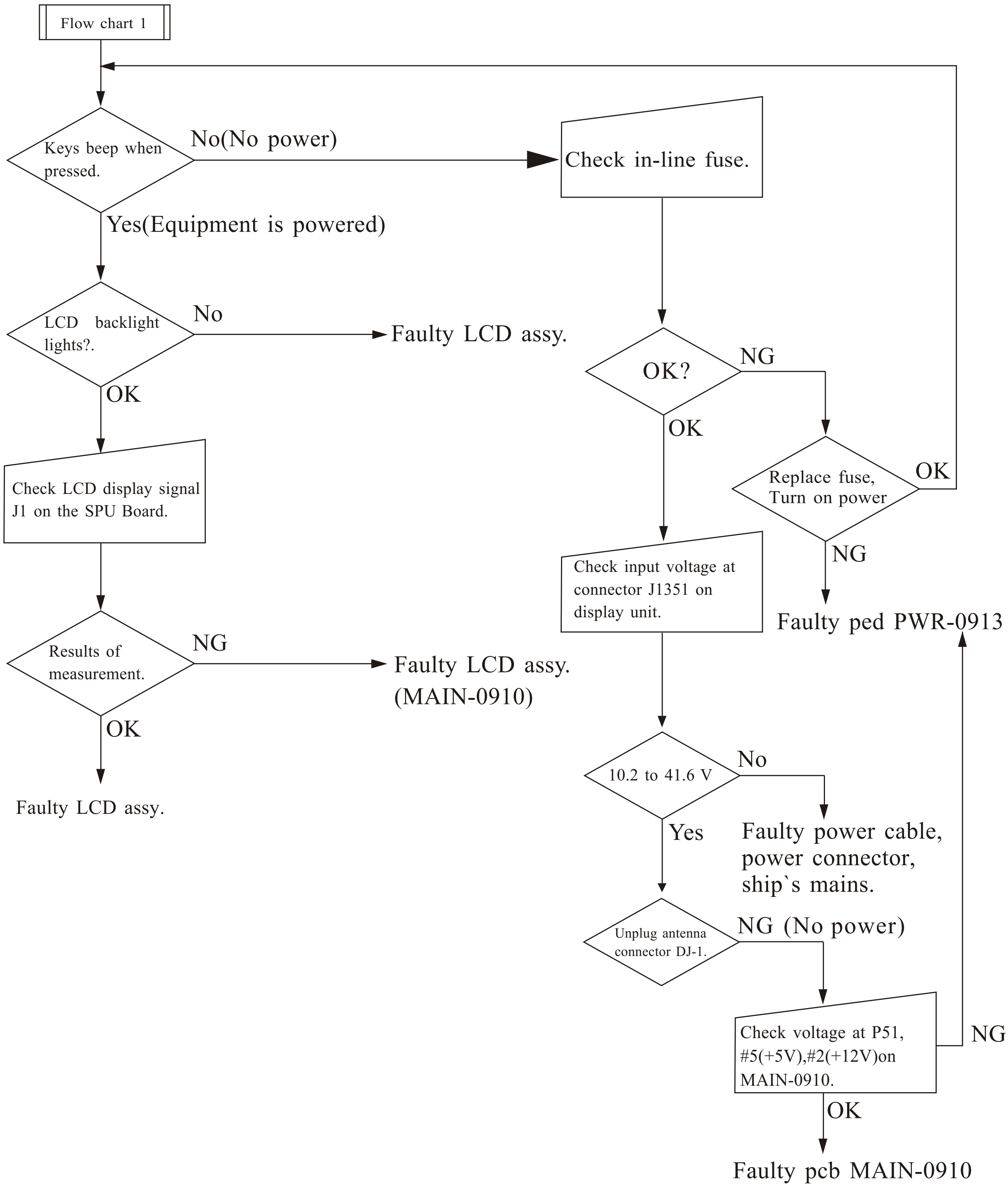
Troubleshooting flow charts

The troubleshooting flow charts help the service technician to diagnose problems. To use the flow charts. First find the symptom and its flow chart number in the flow chart on page 5-2. Then, follow appropriate flow chart to troubleshoot

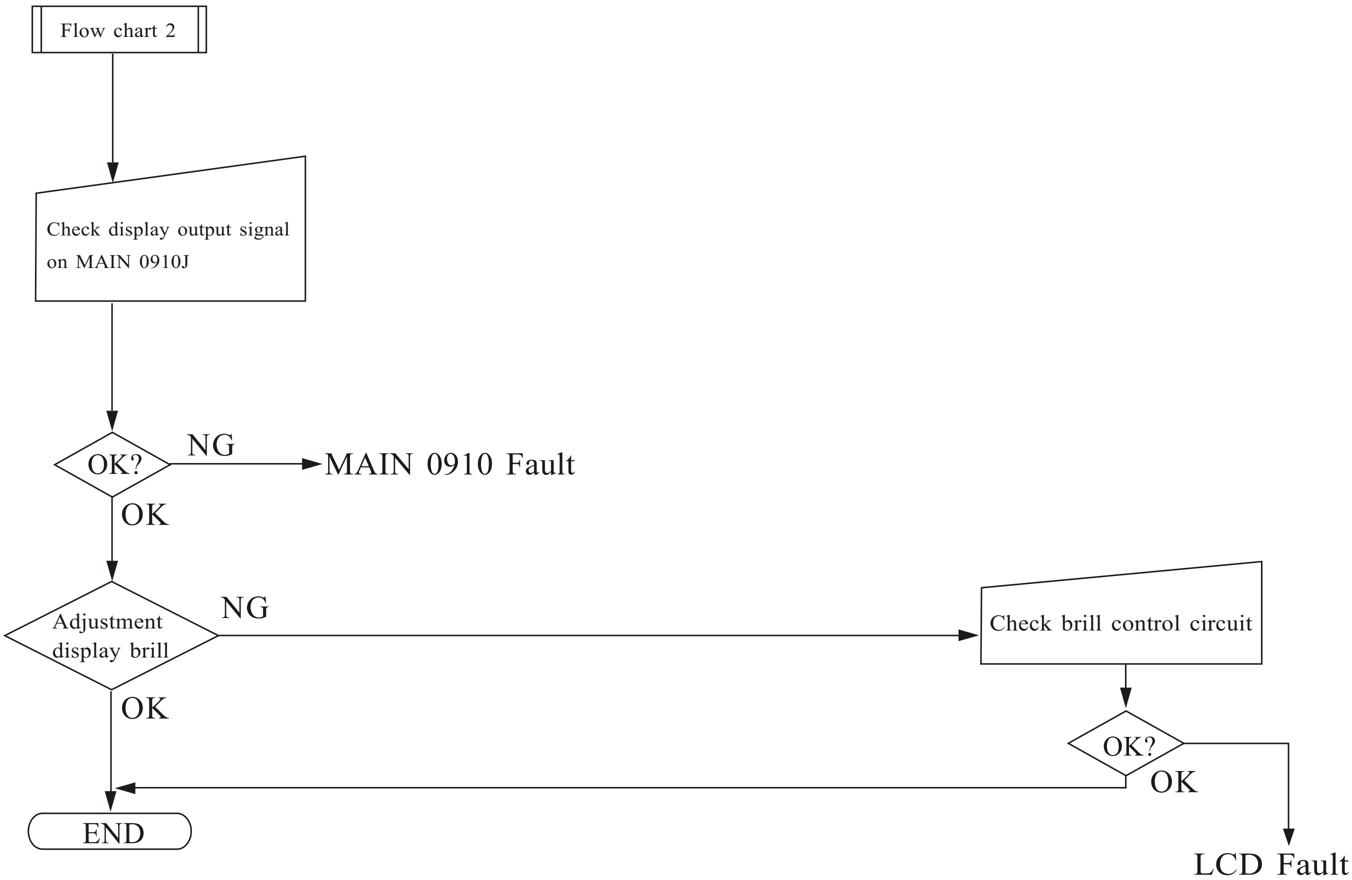
5.2 Troubleshooting Flow Charts



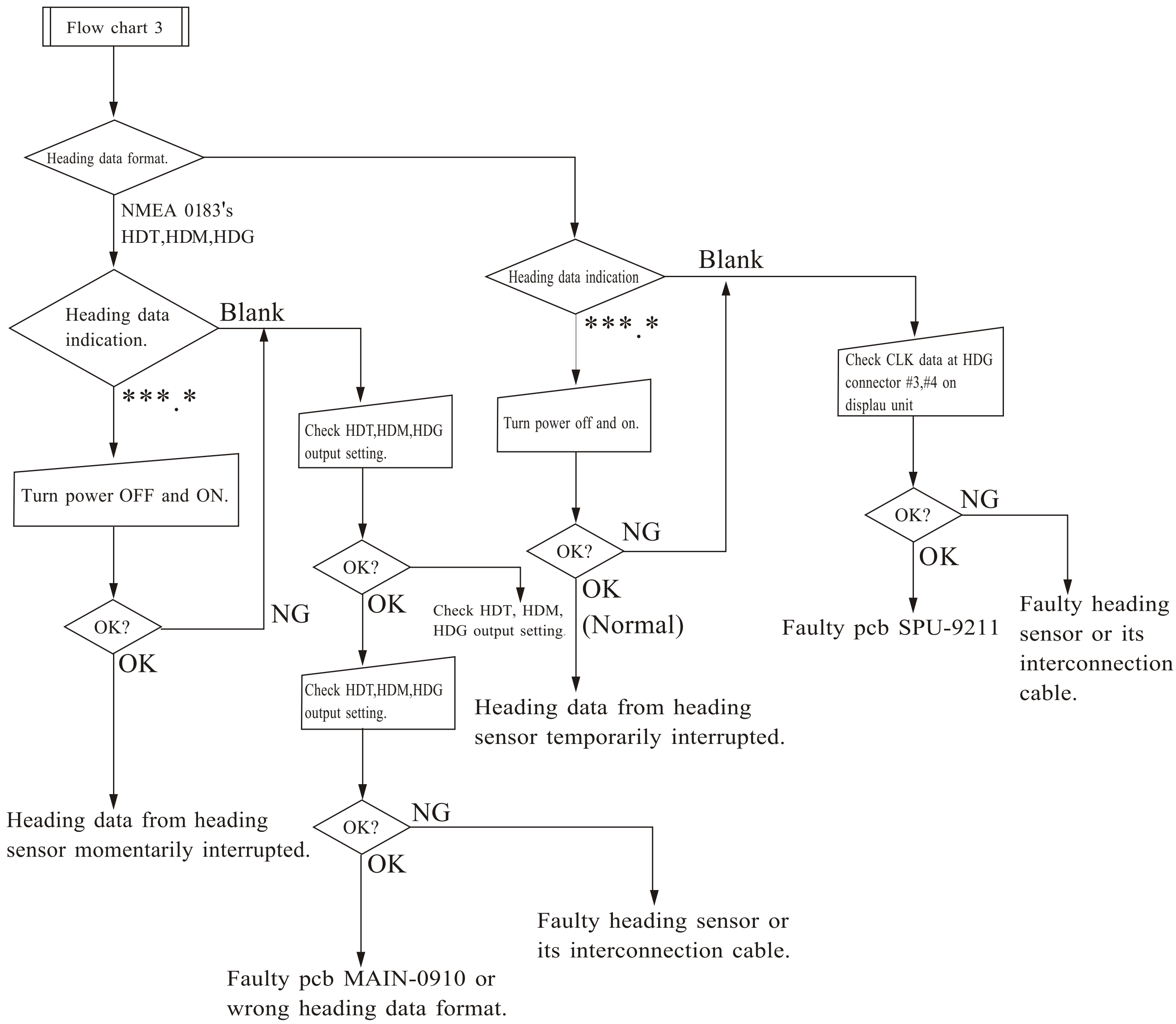
Symptom: Nothing appears on the display.



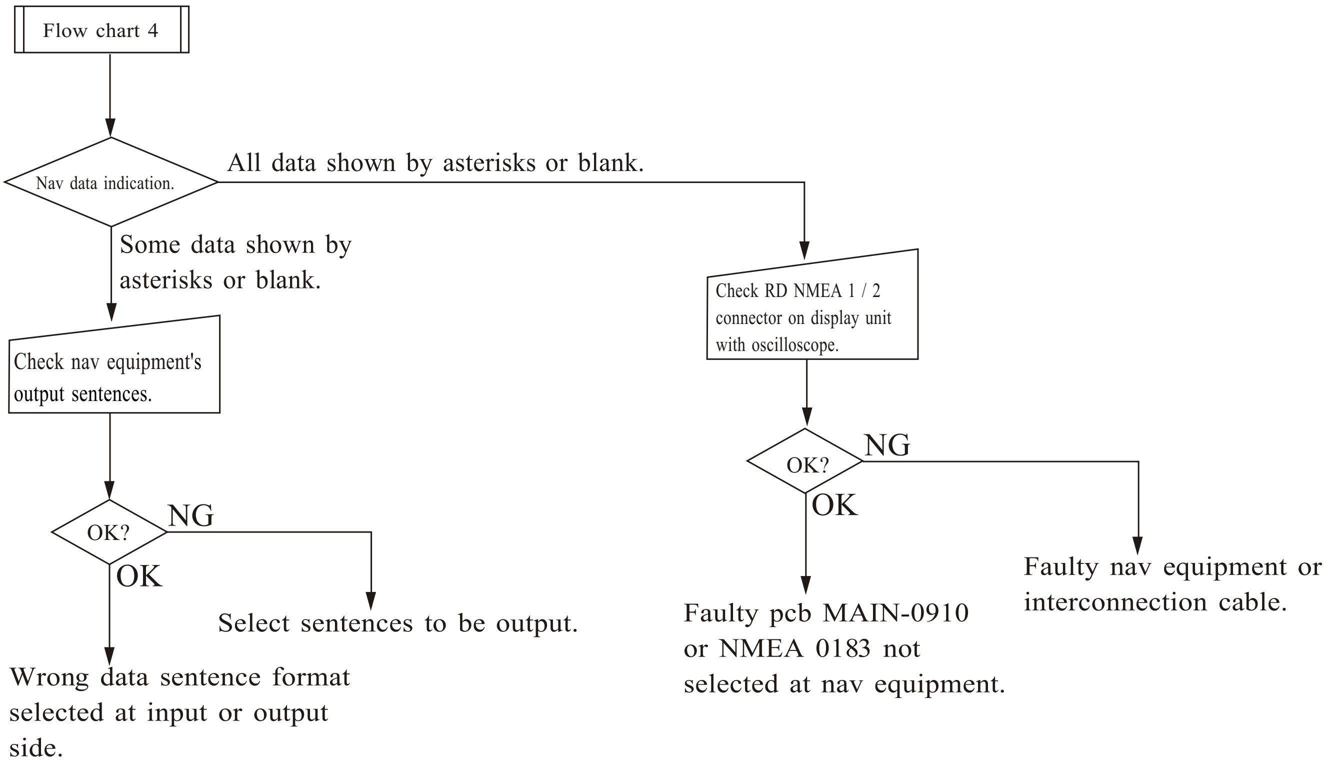
Symptom: Display Abnormal



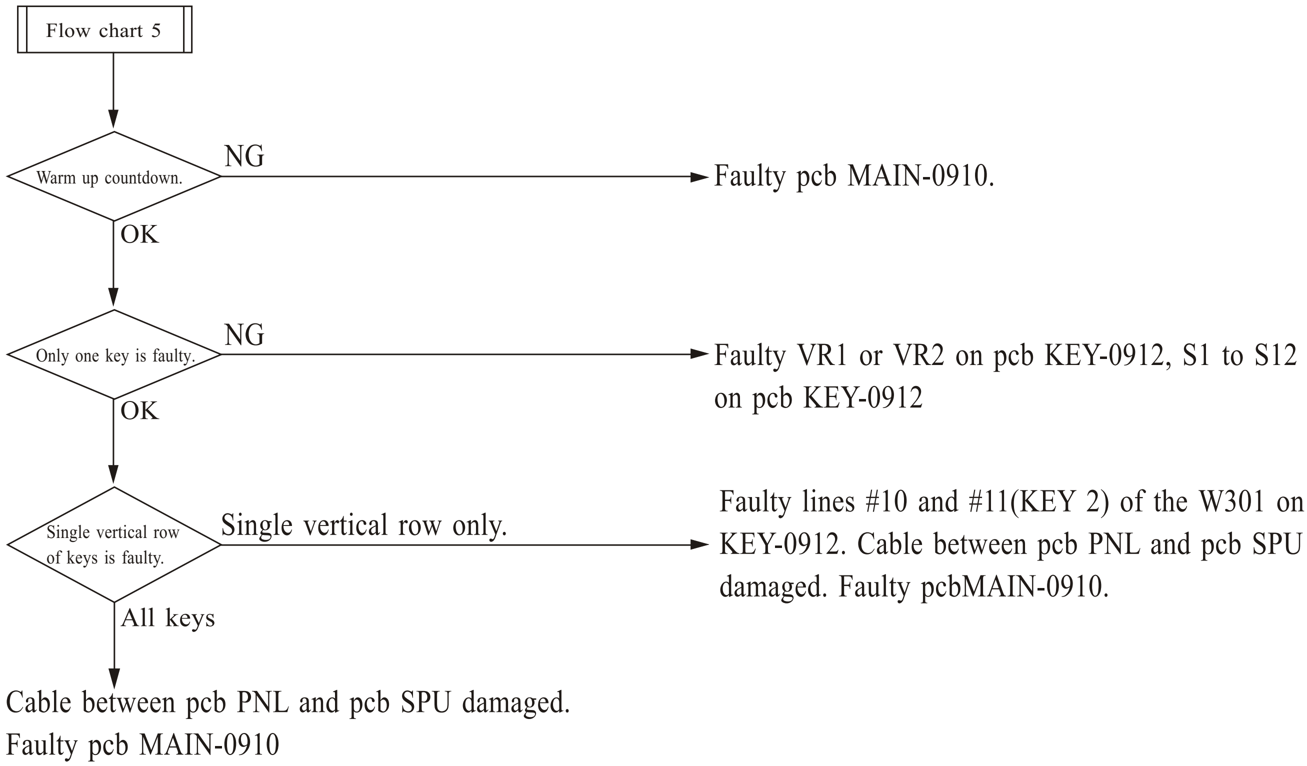
Symptom: No heading data.



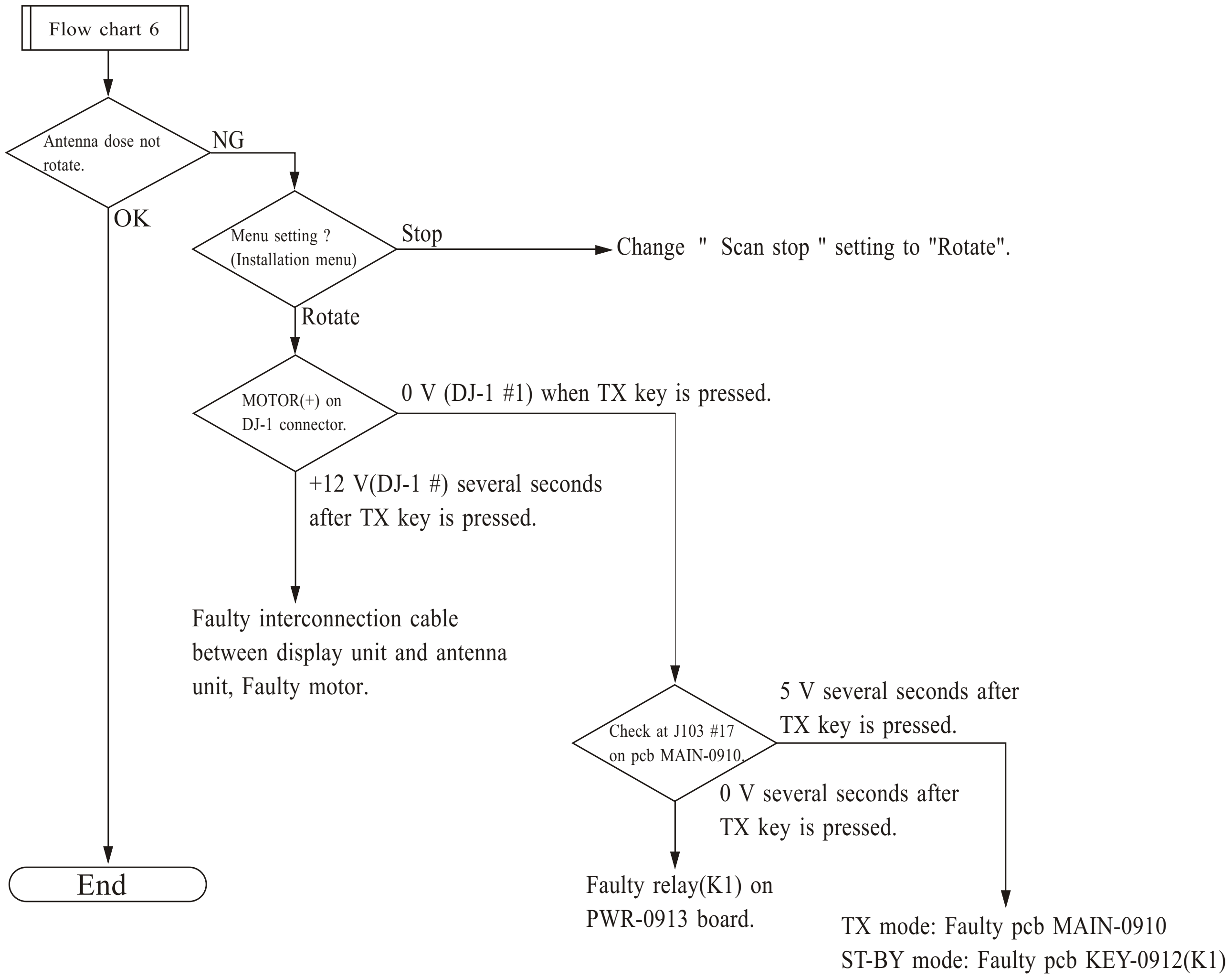
Symptom: No nav data.



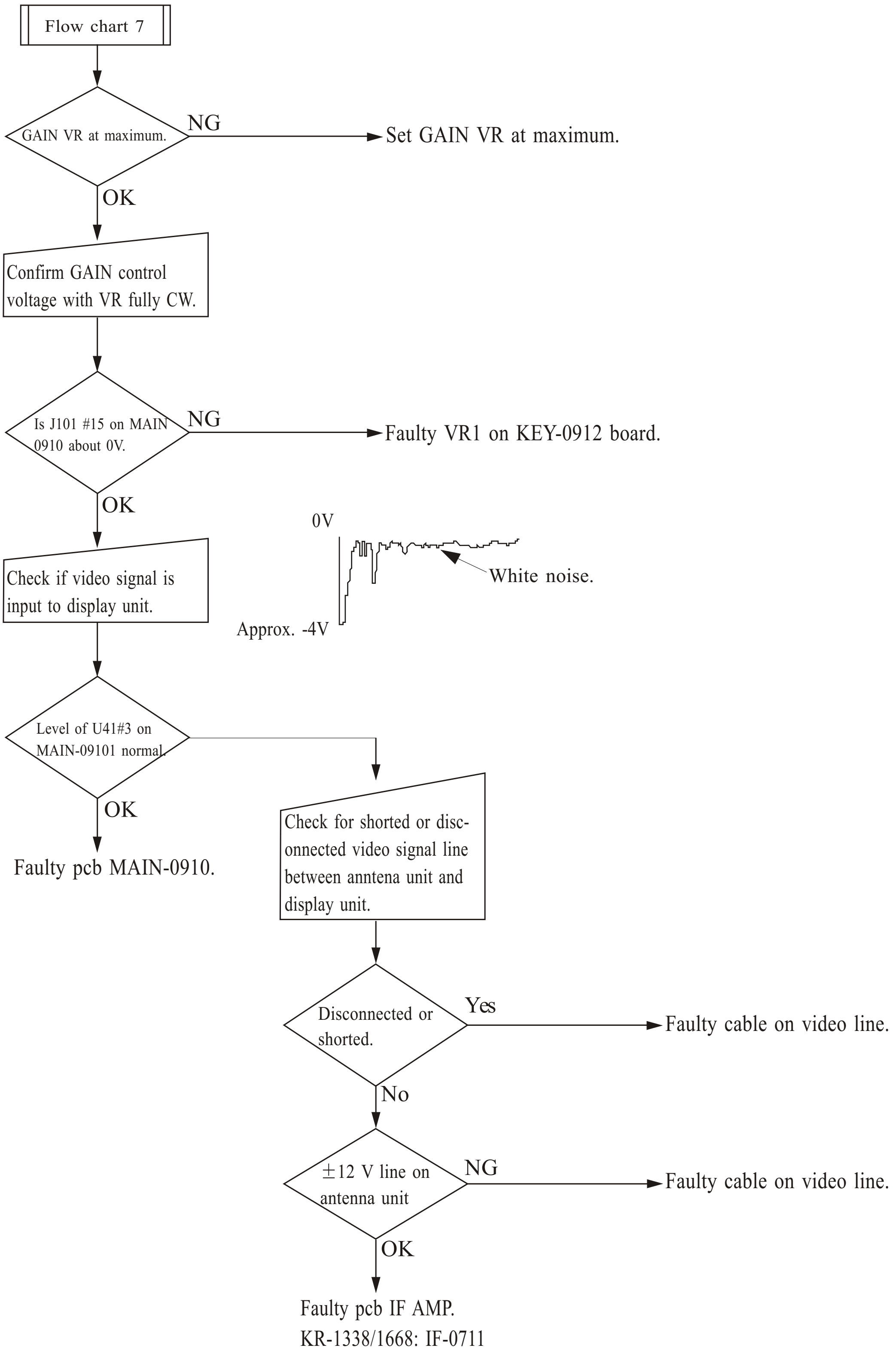
Symptom: key(S) inoperative.



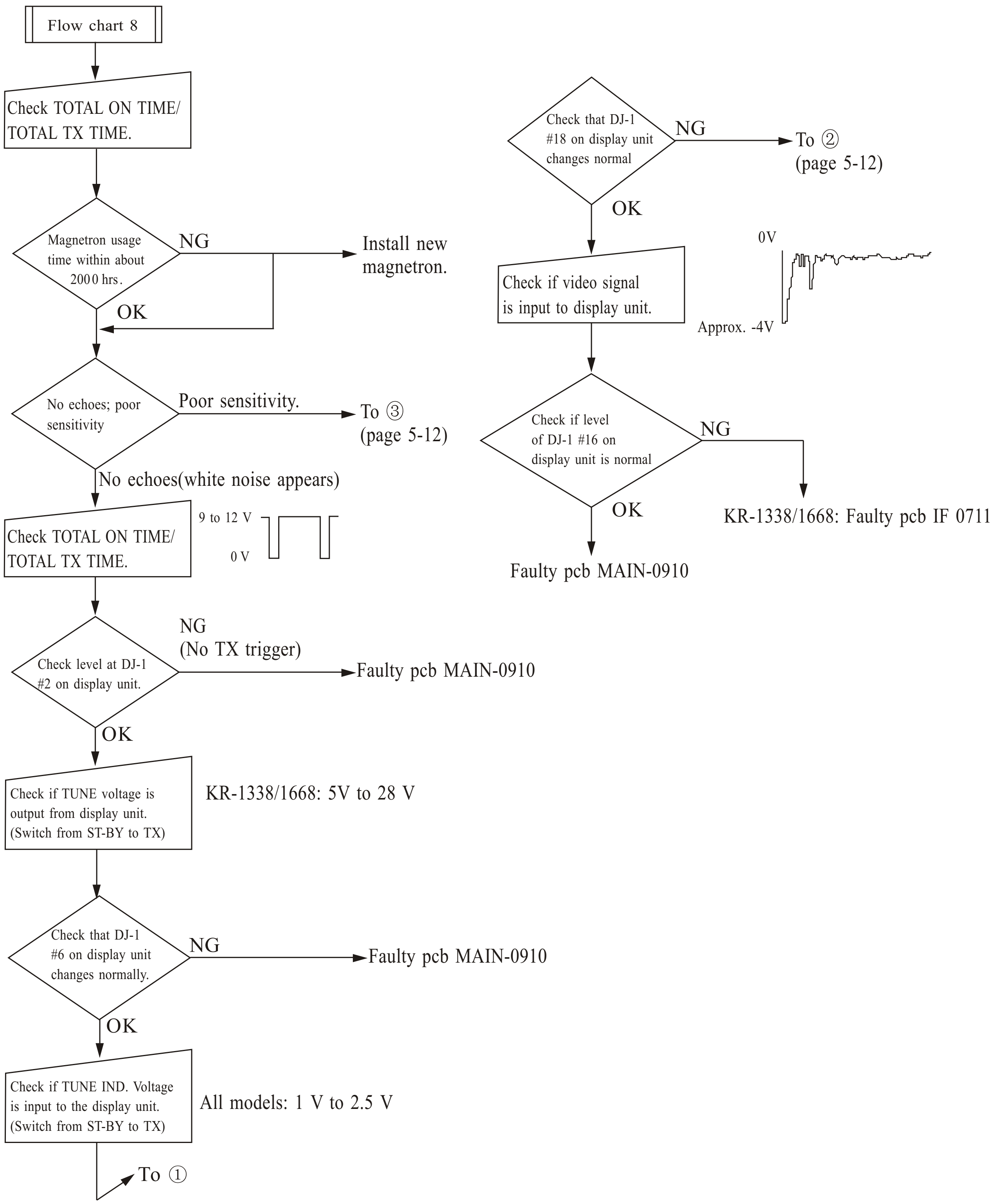
Symptom: Antenna dose not rotate.

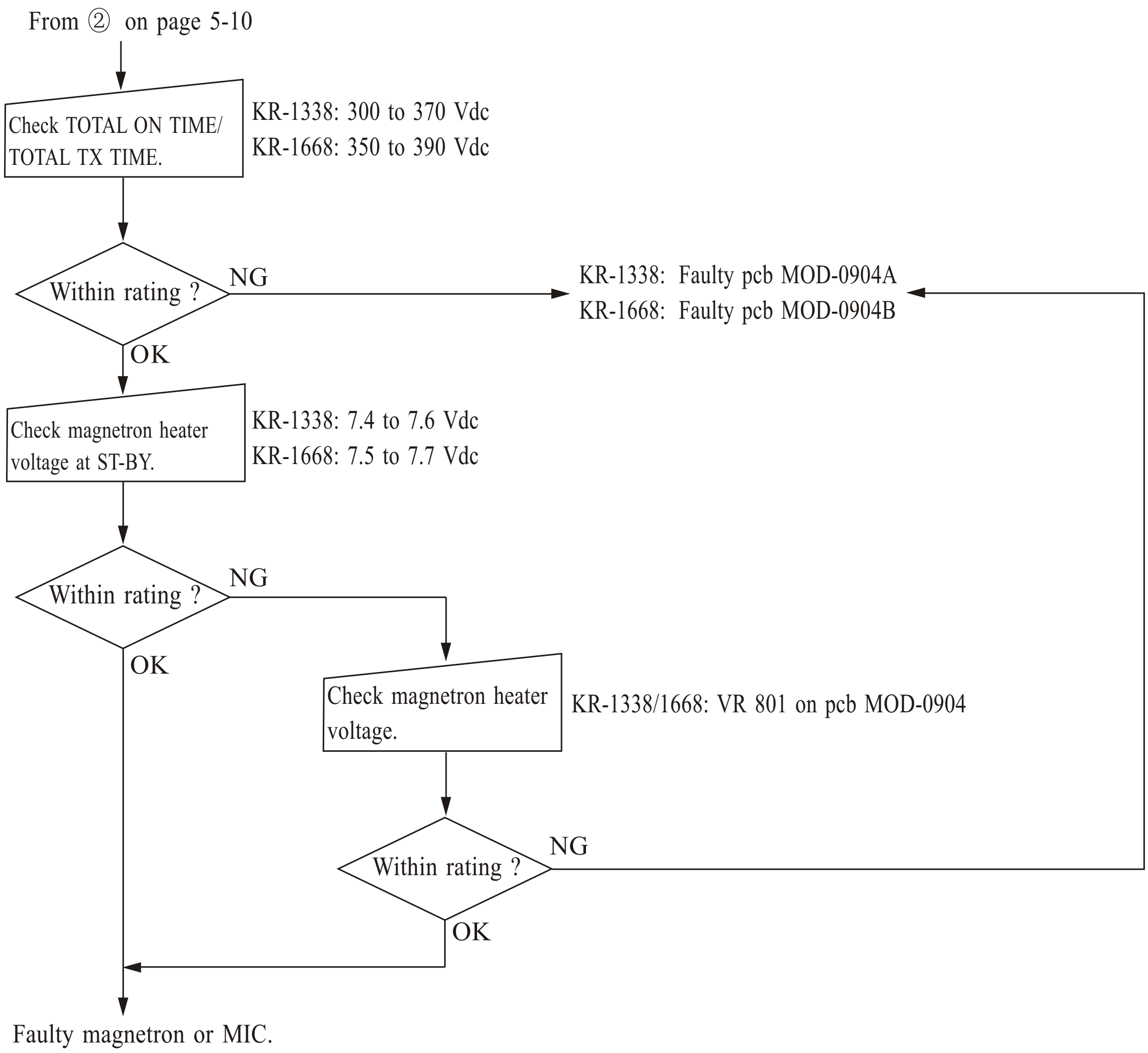


Symptom: No echoes nor white noise.

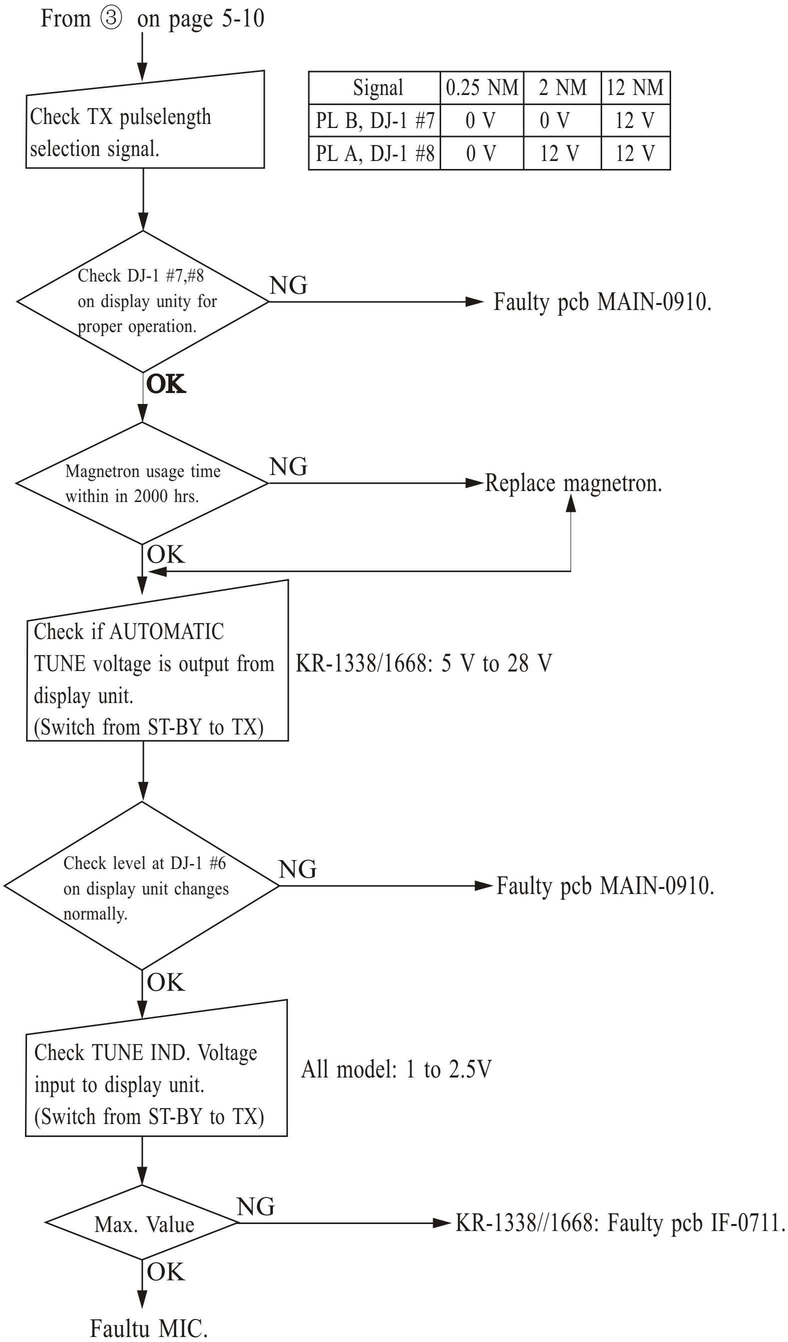


Symptom: Poor sensitivity.

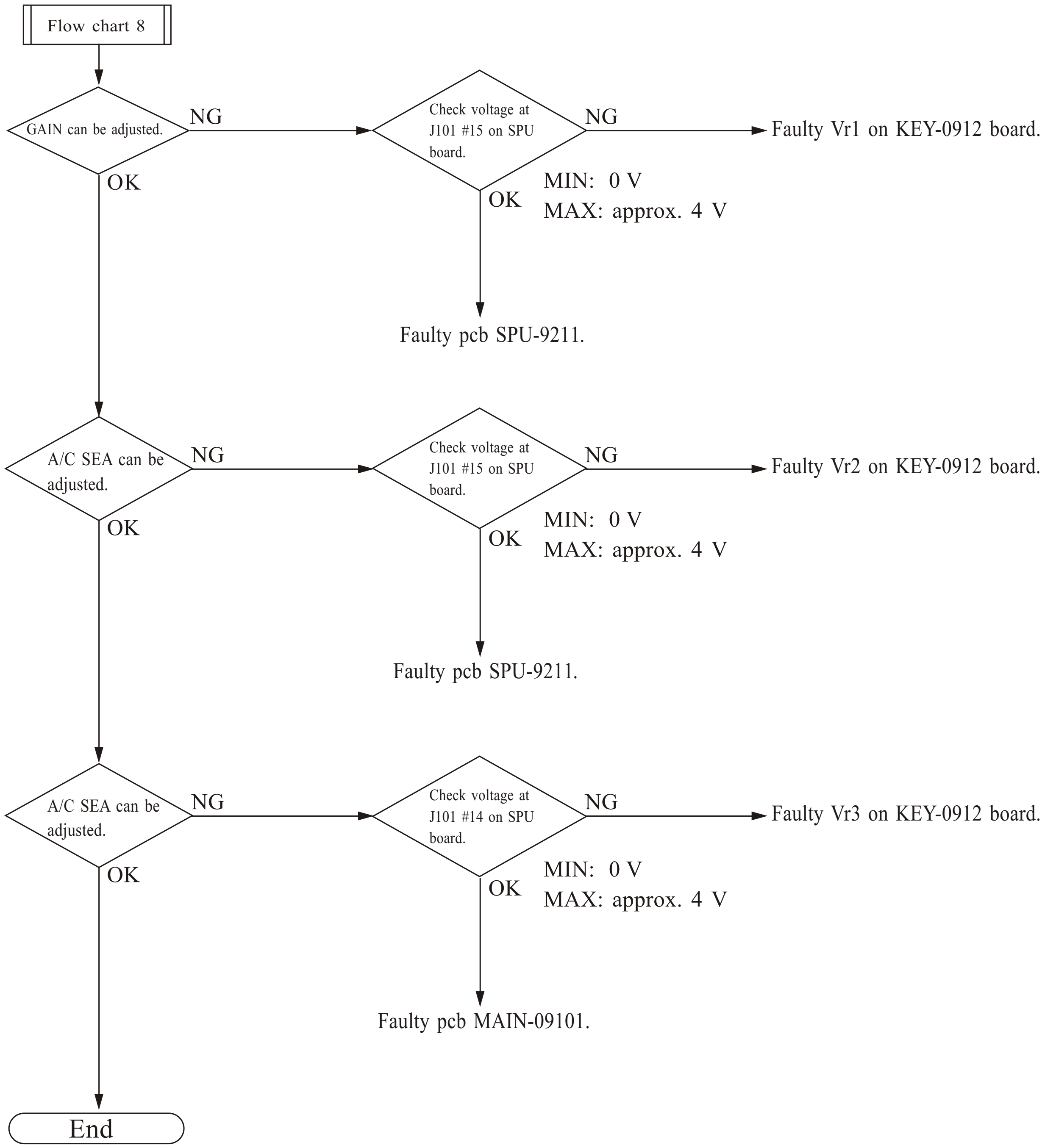



From ② on page 5-10
Check TOTAL ON TIME/
TOTAL TX TIME.
KR-1338: 300 to 370 Vdc
KR-1668: 350 to 390 Vdc
Within rating ?
NG
KR-1338: Faulty pcb MOD-0904A
KR-1668: Faulty pcb MOD-0904B
OK
Check magnetron heater
voltage at ST-BY.
KR-1338: 7.4 to 7.6 Vdc
KR-1668: 7.5 to 7.7 Vdc
Within rating ?
NG
OK
Check magnetron heater
voltage.
KR-1338/1668: VR 801 on pcb MOD-0904
Within rating ?
NG
OK
Faulty magnetron or MIC.

Signal	0.25 NM	2 NM	12 NM
PL B, DJ-1 #7	0 V	0 V	12 V
PL A, DJ-1 #8	0 V	12 V	12 V



Symptom: No GAIN, STC, FTC effect.

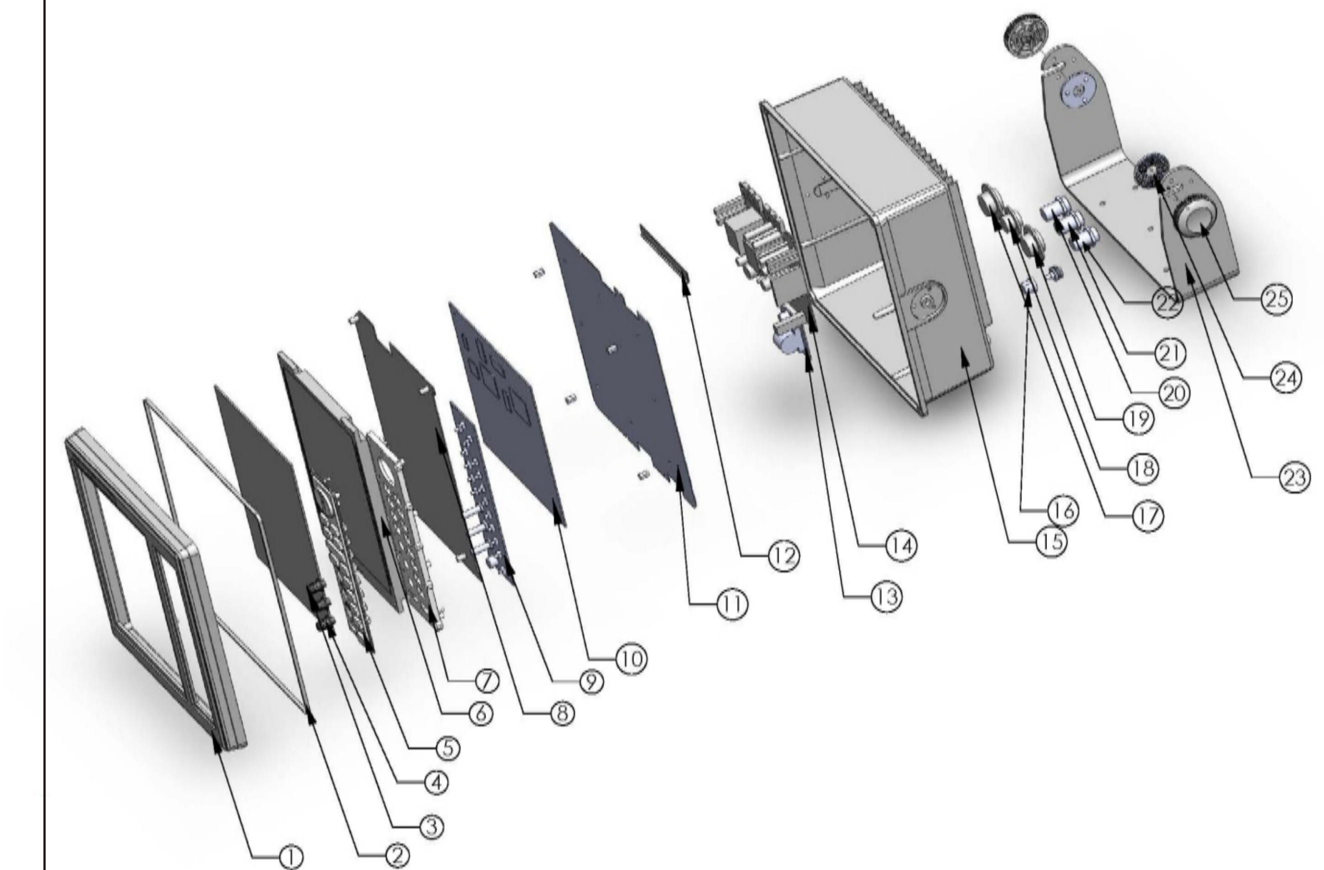


5.3 Message Indications

The following messages appear to call the poerator's attention to missing heading, bearing or gyro pulses.

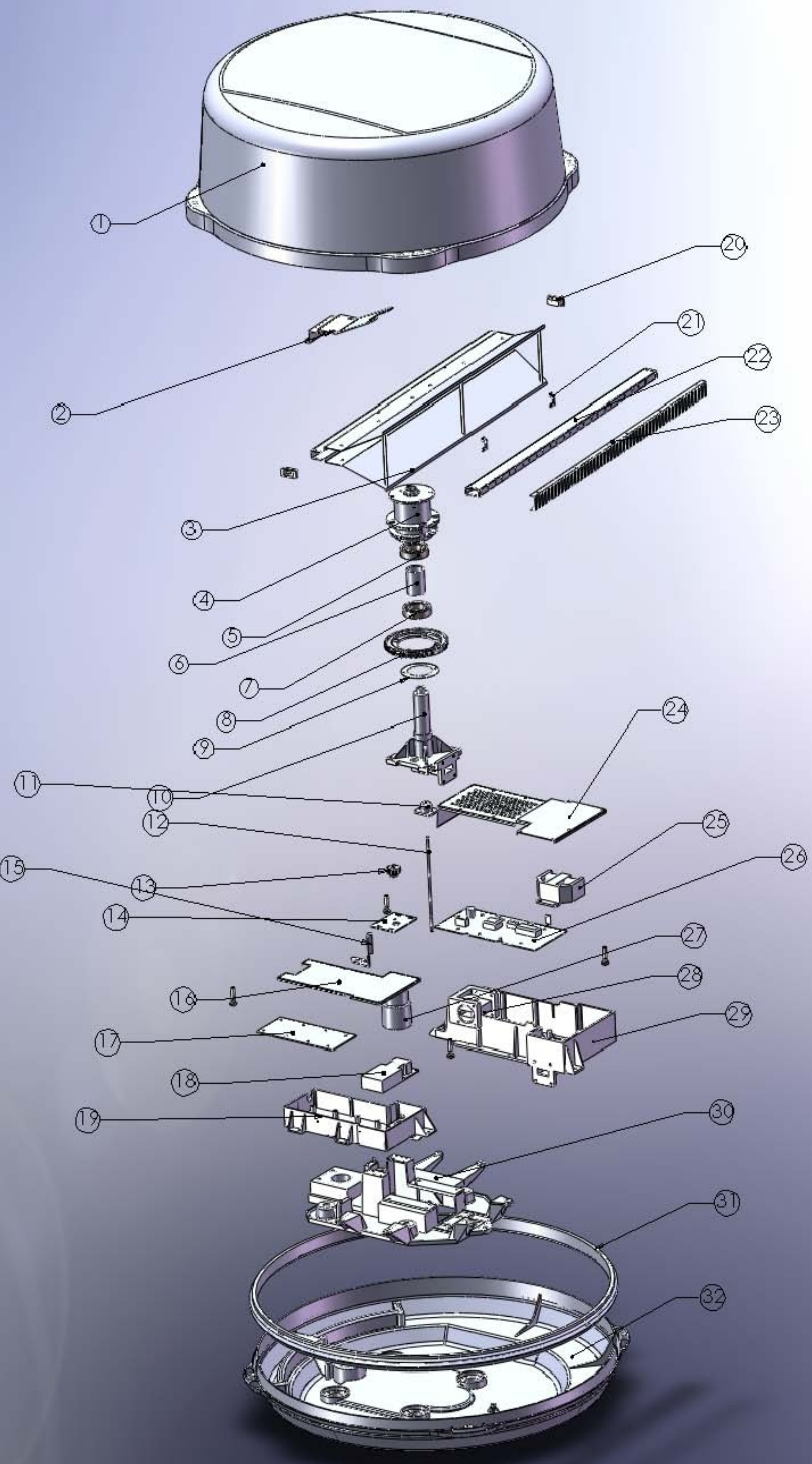
Error Message	Meaning
HD SIG MISSING	Heading pules is not applied to the SPU pcb.
BRG SIG MISSING	Bearing pules is not applied to the SPU pcb.
HDG shows ****.*	****.* Appears when bearing signal is interrupted momently 1) Press [MODEL] key to erase asterisk.(Momental signal loss) 2) Check the connection.

Display Unit Exploded view



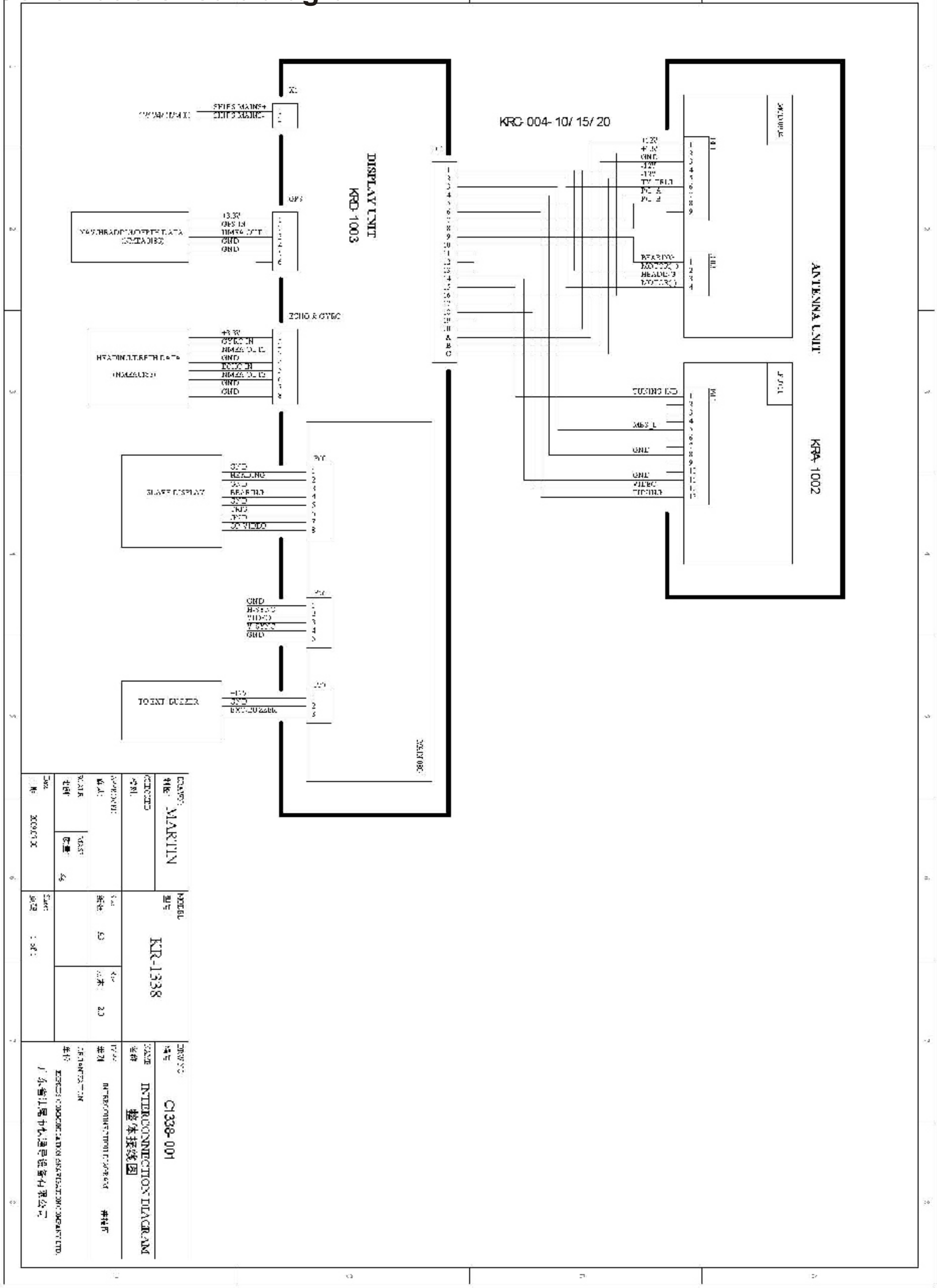
		MODE：KR-1338	
		KR-1338 Display Unit	
SYMBOL	NAME	CODE NO.	NOTES
①	FRONT PANEL	KR—1338—001	
②	GASKET	KR—1338—003	
③	LCD PROTECTION	KR—1338—004	
④	KNOB	KR—1338—009	3
⑤	RUBBER KEY	KR—1338—006	
⑥	10.4〃LCD	KR—1338—019	
⑦	RUBBER KEY BASE	KR—1338—005	
⑧	LCD CHASSIS	KR—1338—010	
⑨	KEY Board	KR—1338—030	
⑩	PROCESSOR Board	KR—1338—027	
⑪	MAIN CHASSIS	KR—1338—011	
⑫	TR FIXING PLATE	KR—1338—012	
⑬	FILTER Board	KR—1338—029	
⑭	POWER Board	KR—1338—028	
⑮	COVER	KR—1338—002	
⑯	FUSE HOLDER	KR—1338—052	
⑰	DJ1 CONNECTER	KR—1338—051	
⑱	POWER CONNECTER	KR—1338—047	
⑲	WATERRPROOF CAP		
⑳	7 Pin Air Outlet	KR—1338—049	
㉑	8 Pin Air Outlet	KR—1338—050	
㉒	6 Pin Air Outlet	KR—1338—048	
㉓	Bracket	KR—1338—013	4
㉔	GASKET	KR—1338—008	2
㉕	KNOB	KR—1338—007	

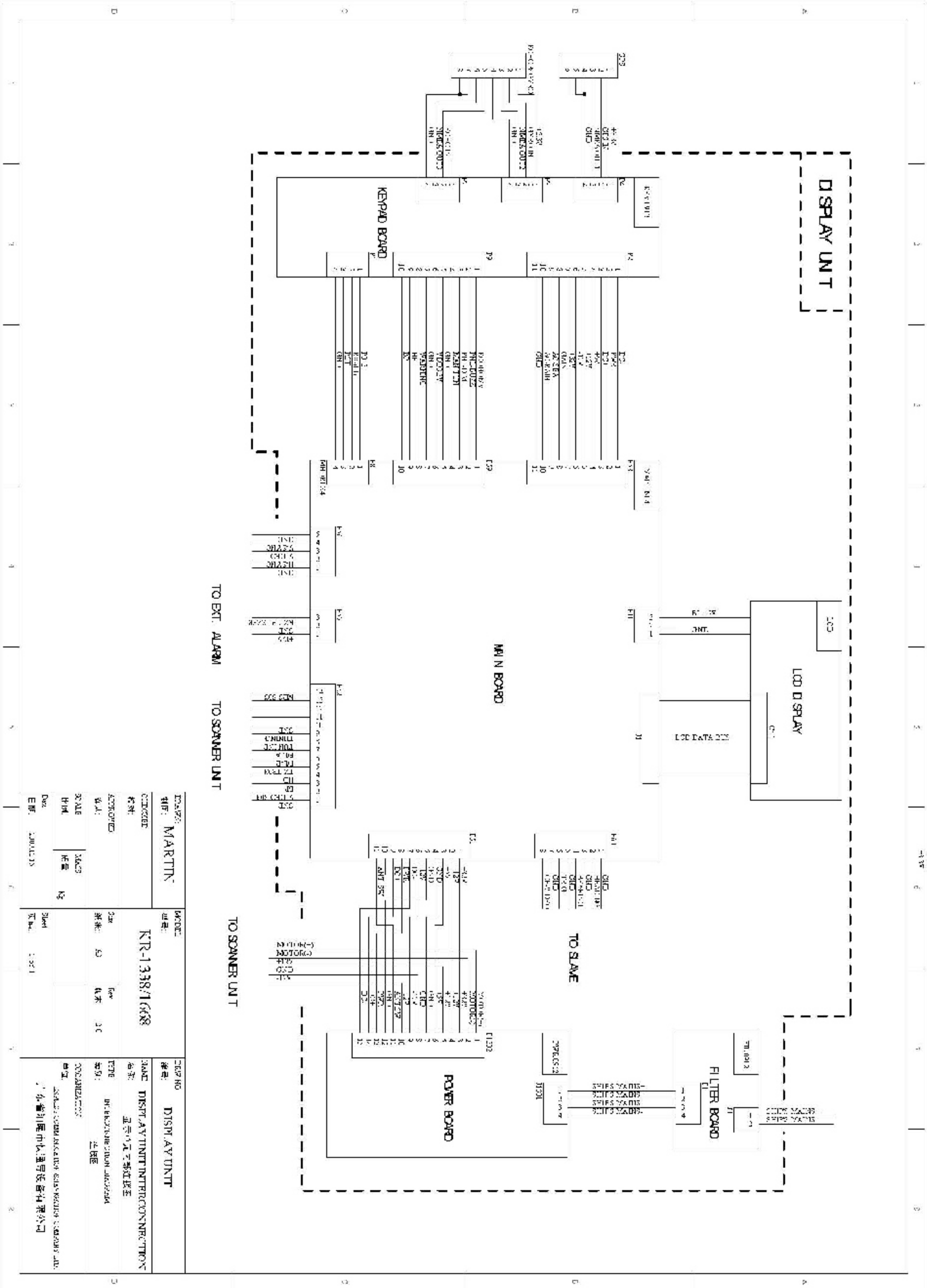
Scanner Unit Exploded View

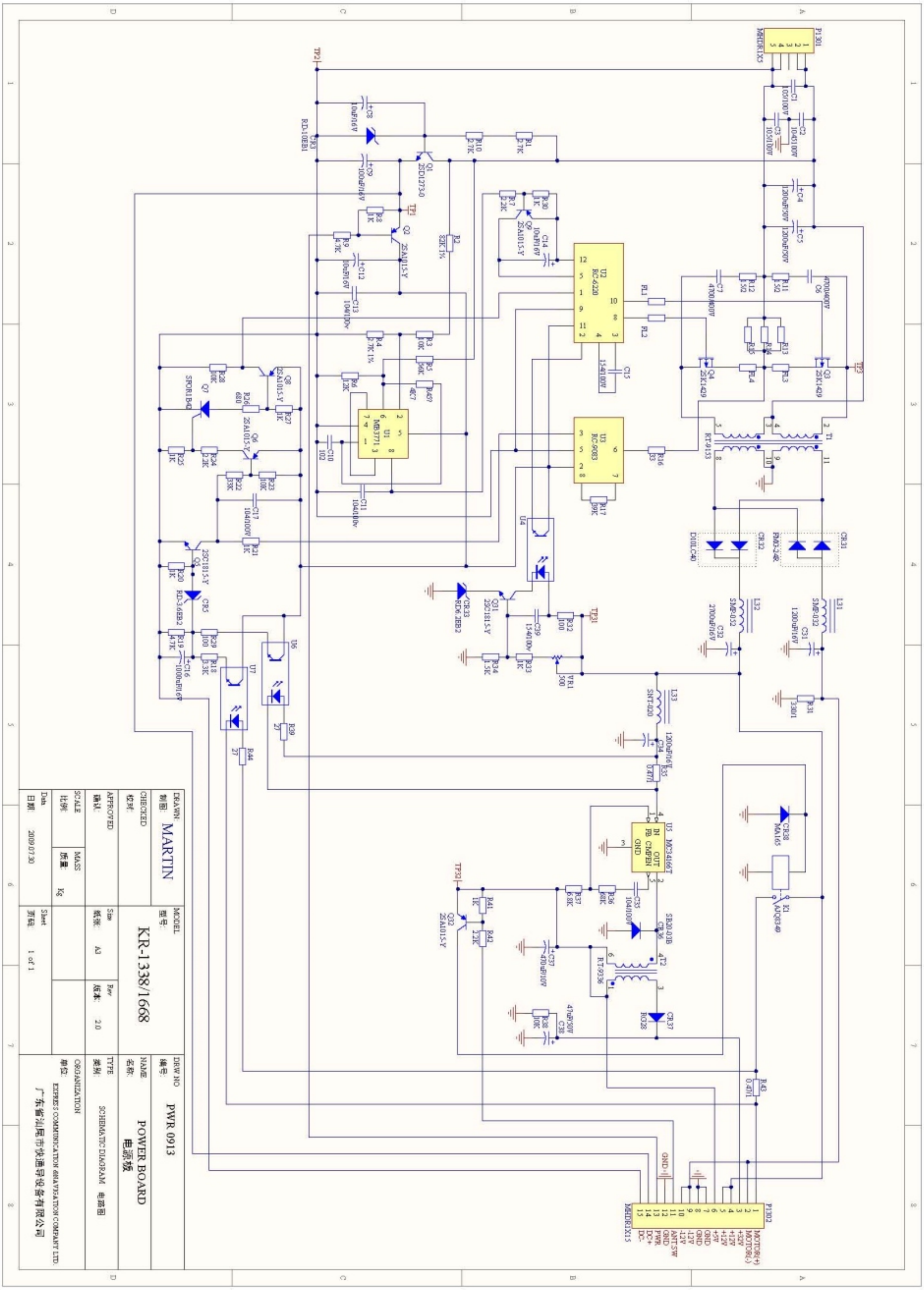


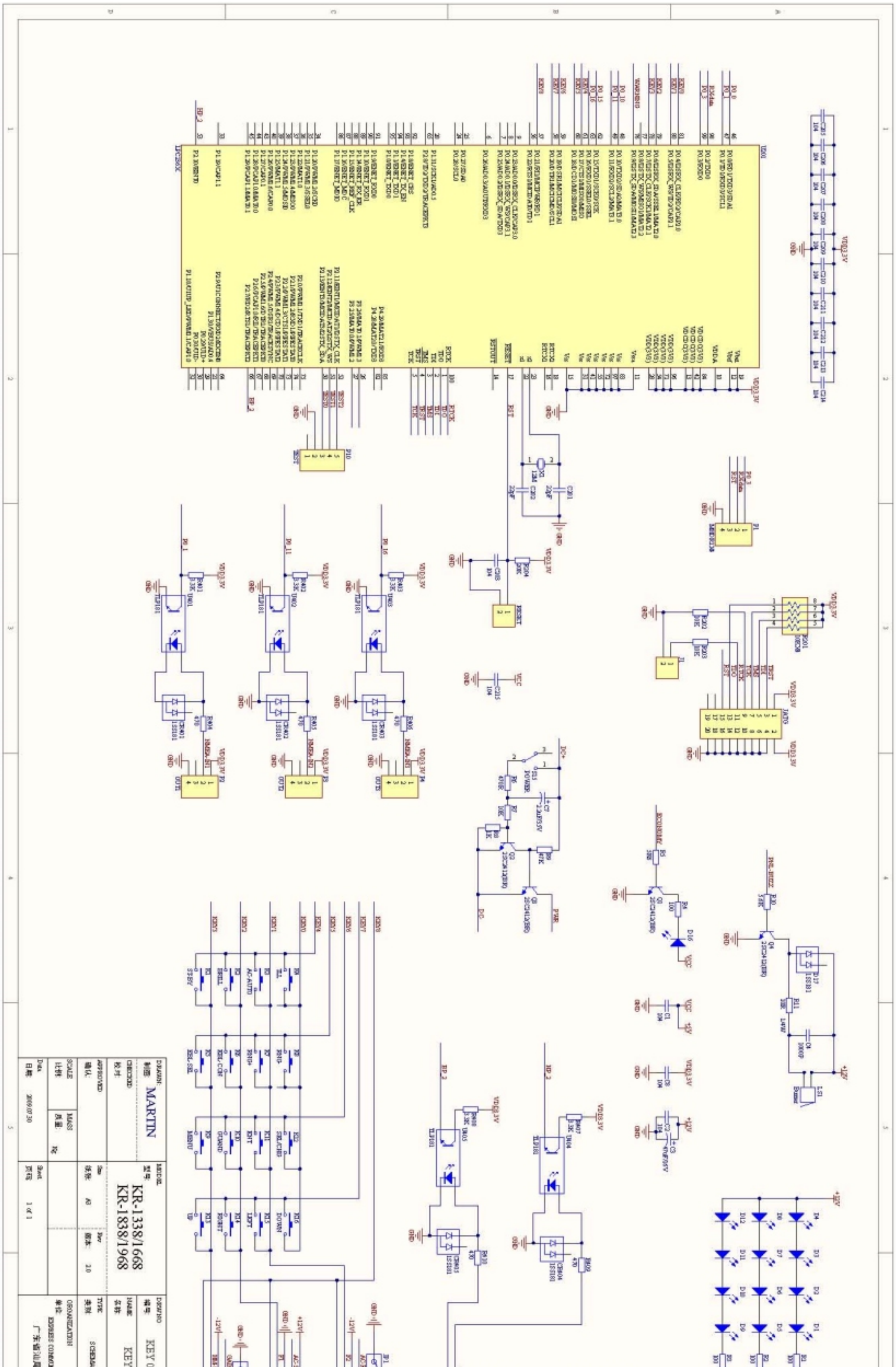
		MODE KR-1338	
		KR-1338 SCANNER UNIT	
SYMBOL	NAME	CODE NO.	NOTES
①	RADOME UPPER ASSEMBLY	KR—1338—053	
②	HORN RETAINER	KR—1338—069	
③	HORN	KR—1338—064	
④	CHOKE	KR—1338—073	
⑤	6005Z BEARING	KR—1338—090	2
⑥	BEARING COLLAR	KR—1338—075	
⑦	6005Z BEARING	KR—1338—090	2
⑧	IDLE GEAR	KR—1338—083	
⑨	BEARING RETAINER	KR—1338—074	
⑩	INNER FEED WAVEGUIDE	KR—1338—072	
⑪	DOOR KNOB	KR—1338—061	
⑫	AXIS	KR—1338—080	
⑬	ACTIVE GEAR	KR—1338—081	
⑭	MOTOR FIXED PLATE	KR—1338—076	
⑮	SW MOUNTING PLATE	KR—1338—079	
⑯	AMP LID	KR—1338—064	
⑰	IF AMP PCB	KR—1338—102	
⑱	MIC	KR—1338—088	
⑲	AMP CASE	KR—1338—059	
⑳	SHORT END	KR—1338—060	
㉑	WG RETAINER	KR—1338—062	2
㉒	SLOTTED WG	KR—1338—067	
㉓	LATTICE	KR—1338—071	
㉔	RF CHASSIS COVER	KR—1338—063	
㉕	MAGNTRON	KR—1338—087	
㉖	MODULATOR	KR—1338—101	
㉗	MOTOR	KR—1338—089	
㉘	CIRCULATOR	KR—1338—086	
㉙	RF CHASSIS	KR—1338—058	
㉚	MOUNTING BASE	KR—1338—057	
㉛	PACKING FOR RADOME	KR—1338—055	
㉜	RADOME BASE	KR—1338—054	

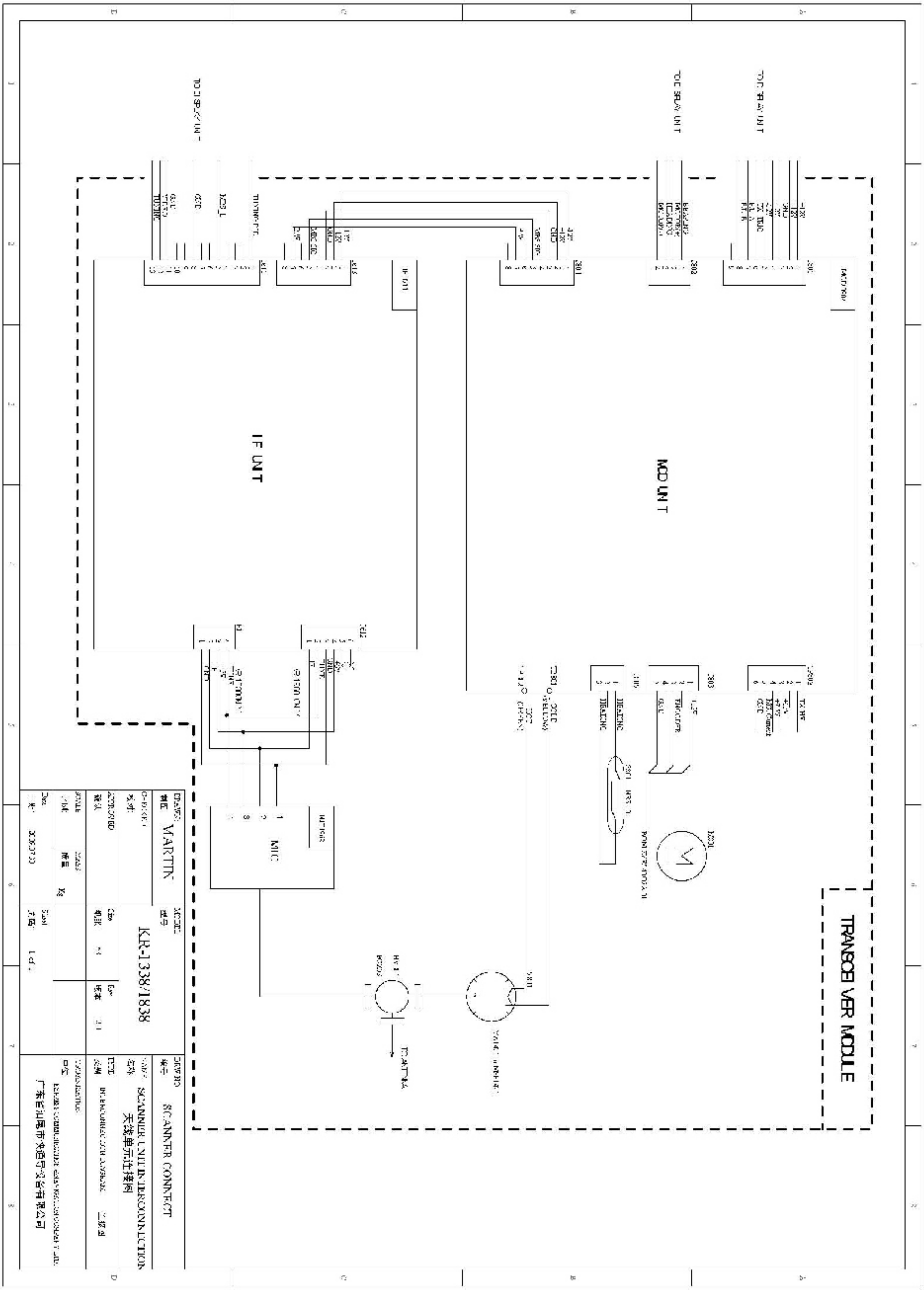
Schematic circuit diagram

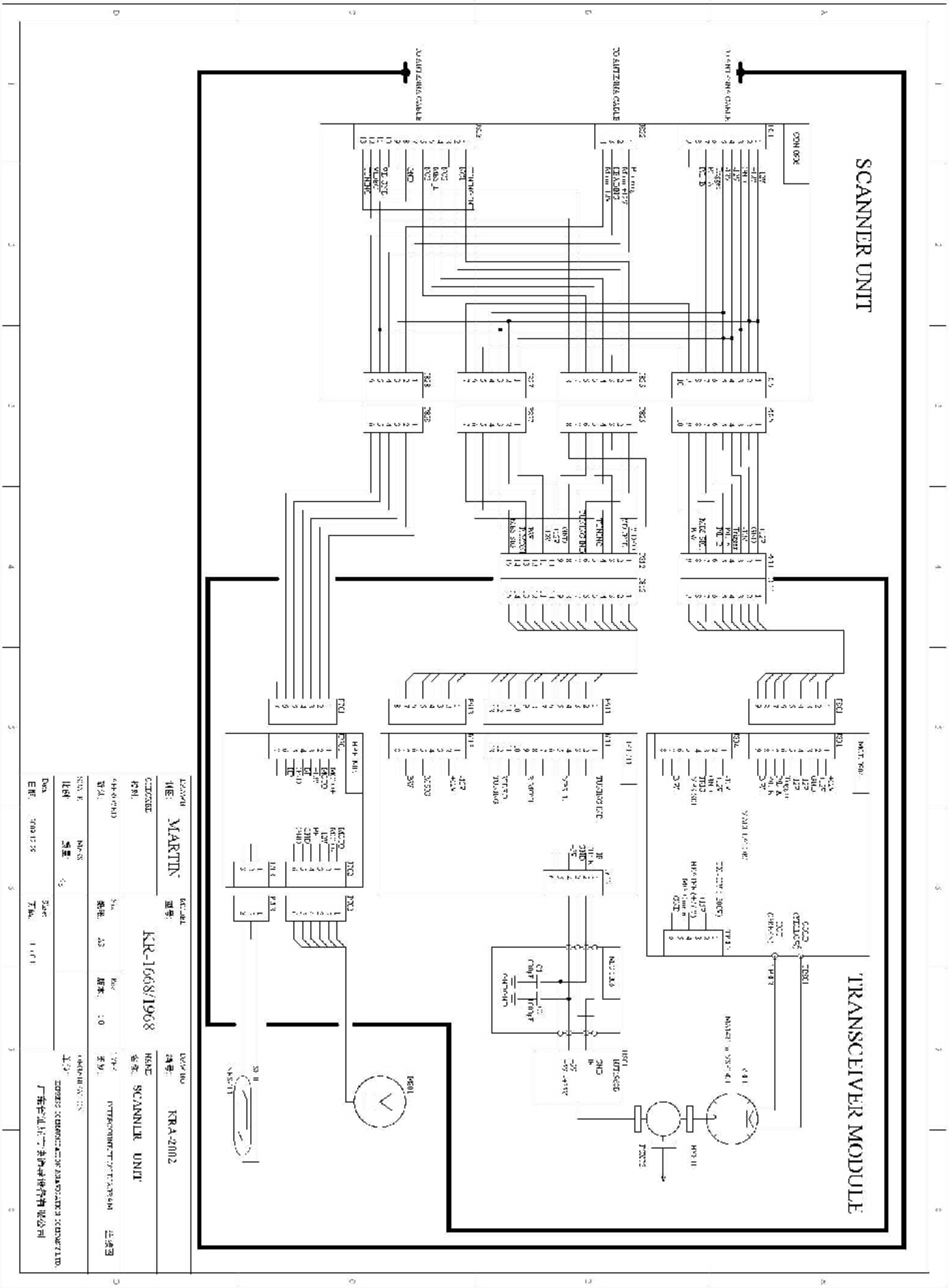


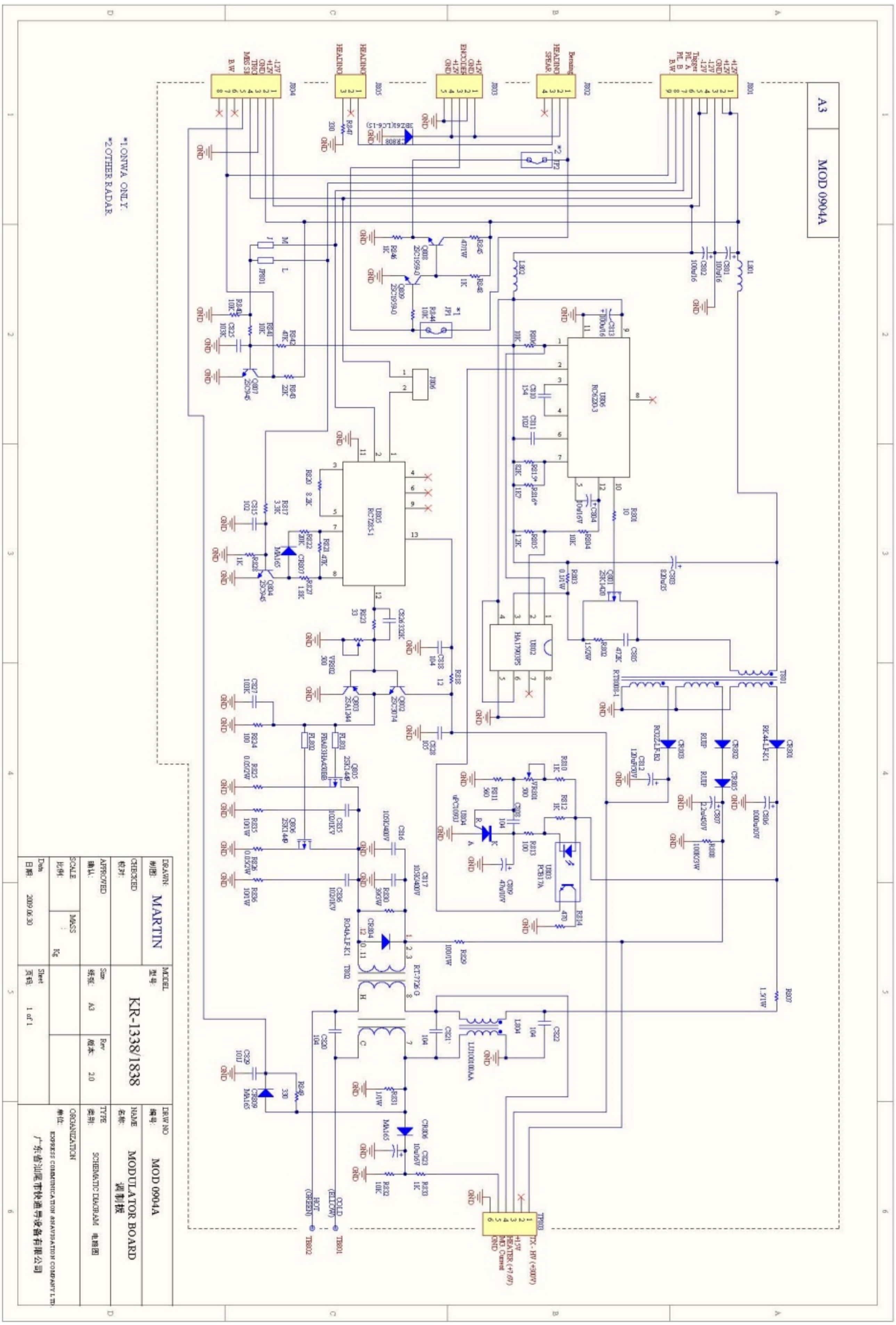

DISPLAY UNIT
KEYPAD BOARD
MAIN BOARD
LCD DISPLAY
TO EXT. ALARM
TO SCANNER UNIT
TO SCANNER UNIT
TO SLAVE
POWER BOARD
FILTER BOARD
MARTIN
KR-1338/1668
DISPLAY UNIT INTERCONNECTION
DISPLAY UNIT

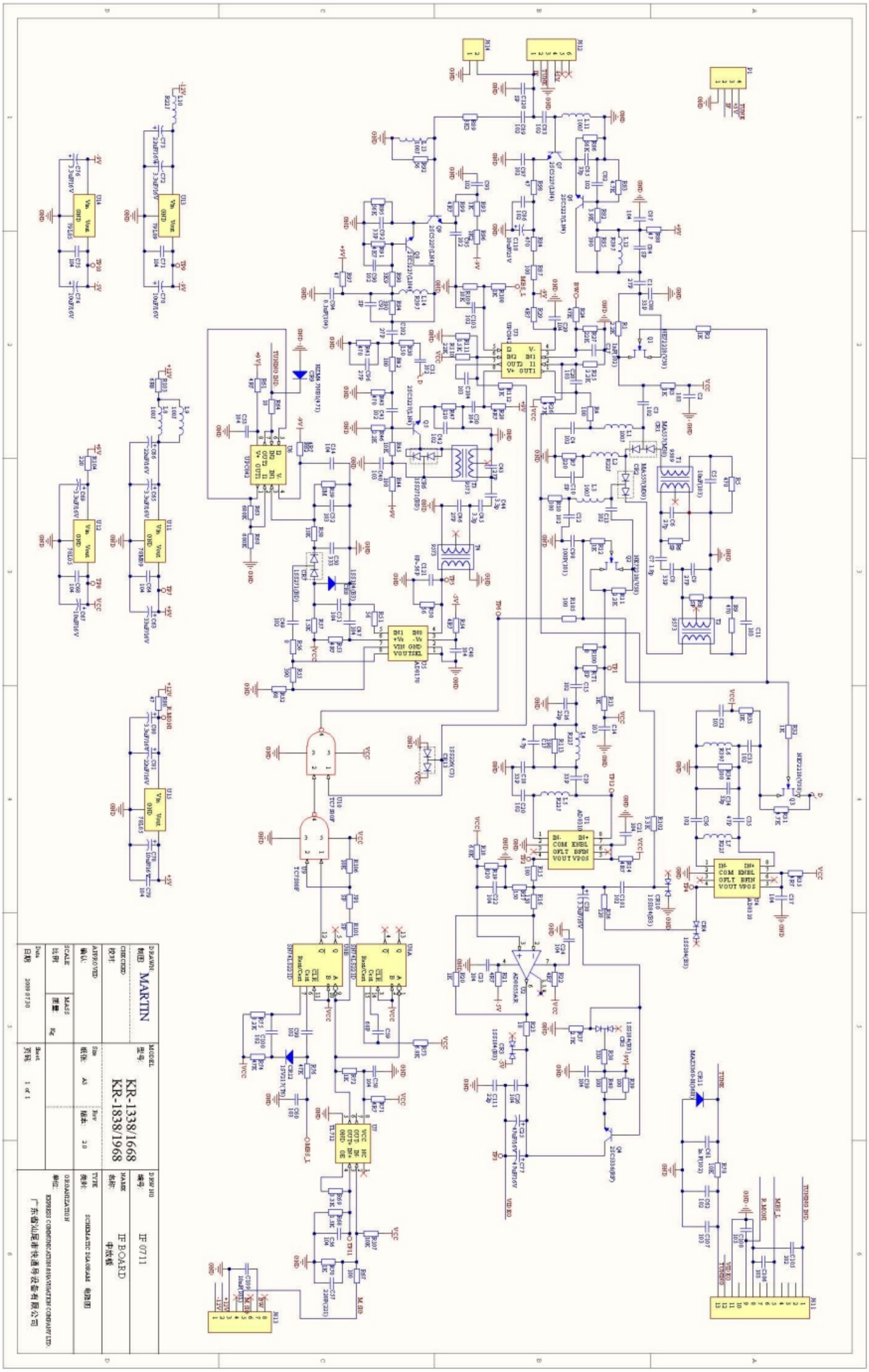

DRAWN 制图 MARTIN
CHECKED 校对
APPROVED 确认
SCALE 比例
MASS 质量 Kg
Date 日期 2009.07.30
MODEL 型号 KR-1338/1668
Size 纸张 A3
Rev 版本 2.0
Sheet 页码 1 of 1
DRW NO 编号 PWR 0913
NAME 名称 POWER BOARD 电源板
TYPE 类别 SCHEMATIC DIAGRAM 电路图
ORGANIZATION 单位
EXPRESS COMMUNICATION &NAVIGATION COMPANY LTD.
广东省汕尾市快通导航设备有限公司

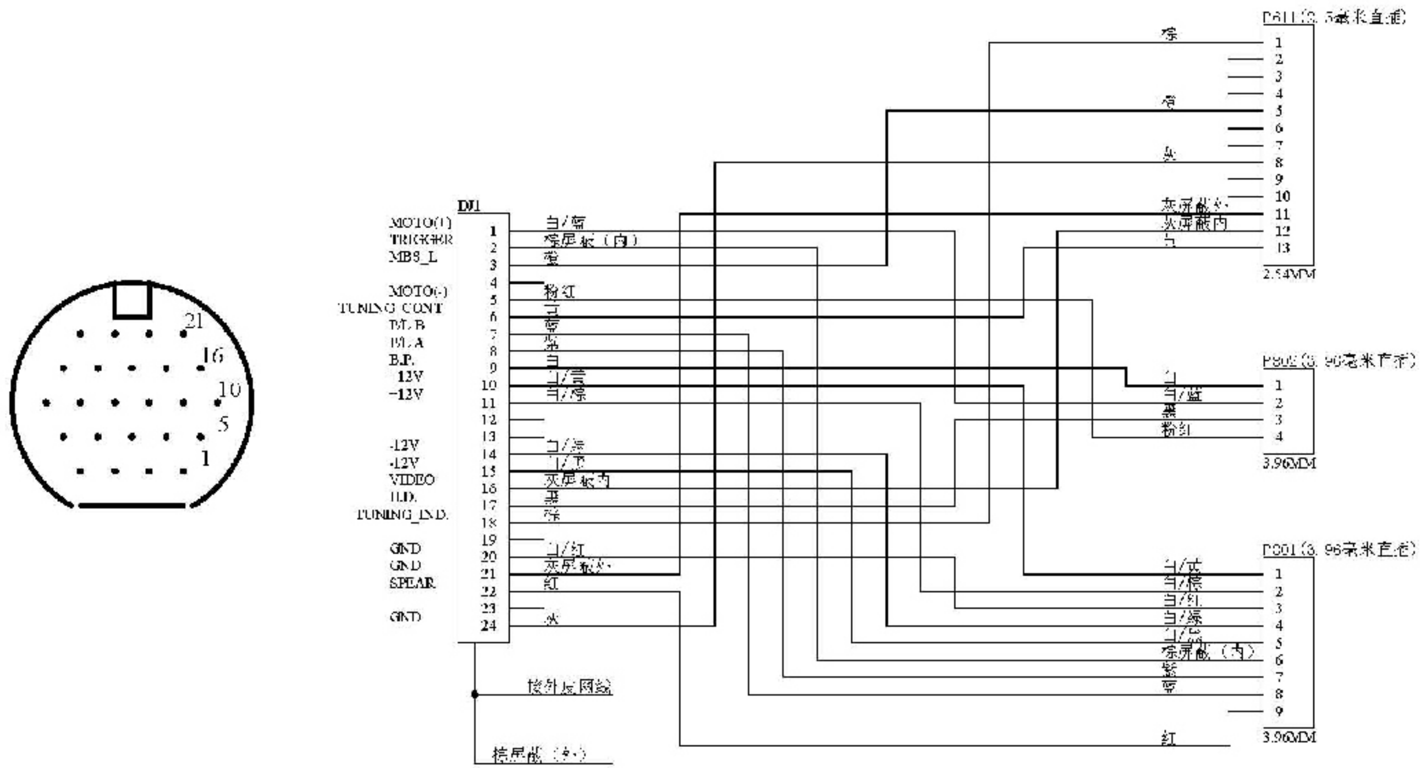

MARTIN
KR-1338/1668
KR-1838/1968
KEY 0912
KEYPAD BOARD


IF UNIT
MOD UNIT
TRANSCEIVER MODULE
MARTIN
KR-1338/1838
SCANNER CONNECT
SCANNER UNIT INTERCONNECTION


SCANNER UNIT
TRANSCEIVER MODULE
MARTIN
KR-1668/1968
KRA-2002
SCANNER UNIT


MOD 0904A
A3
MARTIN
KR-1338/1838
MODULATOR BOARD
调制板
SCHEMATIC DIAGRAM 电路图
2009.06.30
1 of 1
2.0
*1.ONWA ONLY.
*2.OTHER RADAR.


MARTIN
KR-1338/1668
KR-1838/1968
IF 0711
IF BOARD
中放板
SCHEMATIC DIAGRAMS
电路图
2009.07.30
A3
2.0
1 of 1



DRAWN 制图: MARTIN		MODEL 型号: KR-1338/1668 KR-1838/1968		DRW NO 编号:	KRC-004-XX
CHECKED 校对:				NAME 名称:	SIGNAL CABLE
APPROVED 确认:		Size 纸张: A3	Rev 版本: 2.0	TYPE 类别:	SCHEMATIC DIAGRAM 电路图
SCALE 比例:	MASS 质量: Kg			ORGANIZATION 单位:	EXPRESS COMMUNICATION &NAVIGATION COMPANY LTD. 广东省汕尾市快通导设备有限公司
Date 日期: 2009.12.16		Sheet 页码: 1 of 1			